



Park Parade Bondi Traffic and Parking Study

Final Report

December 2010

Prepared for
Waverley Council



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1 INTRODUCTION

gtk consulting was commissioned by Waverley Council (Council), on 21 July 2010, to undertake the *Park Parade Bondi Traffic and Parking Study*. The purpose of the study is “to investigate the traffic and parking issues and options for Park Parade residents and visitors” (Waverley Council 2010, p.1).

The objectives of the study are to:

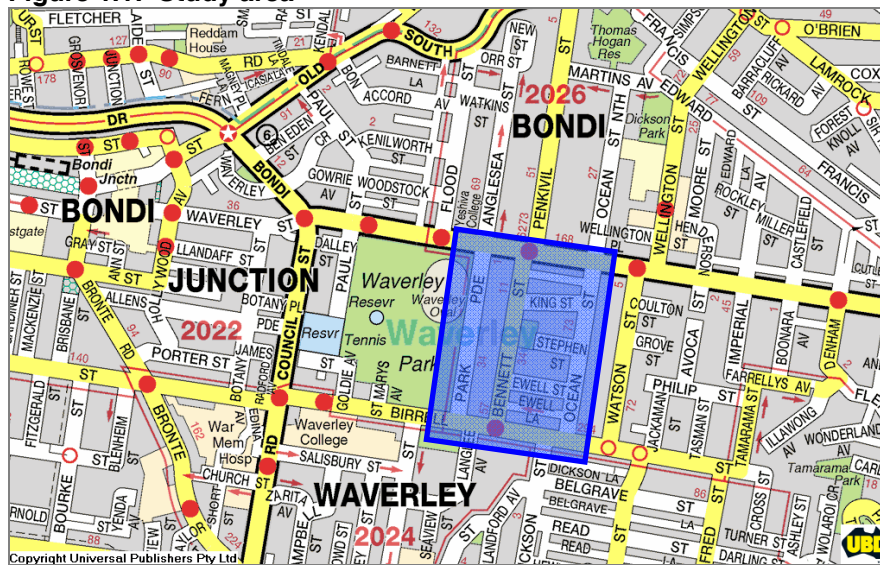
- Investigate the traffic and parking issues of Park Parade.
- Review the background information including extensive community feedback.
- Develop a series of options and recommendations that address the issues and concerns of residents and Council.
- Assess the impacts of any options and recommendations, including advantages and disadvantages of the options.
- Provide a written report of findings to Council.

Council supplied comprehensive background information with the study brief. The documents, reviewed in **Section 2**, raise a number of common issues relating to traffic and parking on Park Parade. A meeting with Councillors and Council Officers on 9 August 2010 provided additional background and an insight into the practical issues and concerns regarding traffic and parking operations on Park Parade and surrounding streets.

The study brief requires the development and assessment of potential traffic and parking management treatments on Park Parade to address the issues identified by residents and Council. Such treatments may have the potential to divert traffic or parking into adjacent streets. The study, therefore, needs to consider streets adjacent to Park Parade that may be affected by any proposed treatment. The streets identified for inclusion in the study area, shown in **Figure 1.1**, are:

- Bondi Road (between Park Parade and Ocean Street South)
- Birrell Street (between Park Parade and Ocean Street South)
- Bennett Street (between Bondi Road and Birrell Street)
- Ocean Street South (between Bondi and Birrell Street)

Figure 1.1: Study area



Source: UBD Australian City Streets v6.0 (licensed to gtk consulting)

The study area (refer **Figure 1.2**) is predominantly residential comprising semidetached and detached dwellings and higher density apartments/flats, combined with business and retail uses along Bondi Road. Park Parade forms the eastern boundary of the 11.1 hectare Waverley Park, the main open space in the Bondi Junction area. Waverley Park is used extensively for weekend sporting fixtures and training on weeknights throughout the year. Bondi Junction, a major commercial and retail centre is located 900 metres to the west of Park Parade with Bondi Beach, 2 kilometres east along Bondi Road.

Figure 1.2: Aerial view study area



Source: Waverley Council 2010

This report is based on traffic surveys and observations undertaken by **gtk consulting** in July and August 2010 and on parking data provided in the traffic and parking study¹ undertaken for the *Waverley Park Pavilion and Amenities Block Development Application*. Such primary sources of information concerning traffic and parking activities, together with observations of the behaviour of drivers and parkers, has enabled **gtk consulting** to present a practical interpretation of the data collected during the course of the study.

This report sets out the work completed for the study, findings of the study and provides options for traffic and parking management and infrastructure improvement on Park Parade.

¹ *Waverley Park Pavilion Traffic and Parking Study* (SCAPE 2009)

2 BACKGROUND

Waverley Council has provided background information for this study in the form of reports, studies and submissions undertaken for Waverley Park and Park Parade. A number of the documents reviewed raise common issues relating to traffic and parking on Park Parade. This report has, therefore, used information relevant to the *Park Parade Traffic and Parking Study* from the following documents:

- *Waverley Park Pavilion Traffic and Parking Study* (SCAPE 2009)
- *Submission - Waverley Park Draft Master Plan* (Waverley Park Master Plan Residents Subcommittee 2009)
- *Issues Paper - Conversion of Park Parade to One-Way Traffic Flow* (Penkivil Precinct Executive 2009)
- *Report to Waverley Local Traffic Committee - Bennett Street, Ewell Street, King Street, Ocean Street South, Park Parade and Stephen Street, Bondi – Introduction of Residential Preferential Parking* (Waverley Council 2008)

Waverley Park Pavilion Traffic and Parking Study (SCAPE 2009)

The *Waverley Park Pavilion Traffic and Parking Study* was undertaken by SCAPE on behalf of Waverley Council to support a development application for the proposed Waverley Park Pavilion and Amenities Block. This development application was subsequently approved by Council in December 2009. The traffic and car parking recommendations contained in the SCAPE study were accepted by Council in its determination of the development application.

The SCAPE study contained estimates of car parking generation and availability for the Waverley Park Pavilion redevelopment as follows:

- The additional car parking generated by the new pavilion and amenities block in Waverley Park is in the range of 16-39 spaces.
- A minimum of 85 car parking spaces are available throughout the day, on weekends, on the streets surrounding Waverley Park.
- A minimum of 78 car parking spaces are available throughout the day, on weekdays, on the streets surrounding Waverley Park.
- A minimum of 130-179 car parking spaces are available after 4.00pm on weekdays on the streets surrounding Waverley Park.

- 179 spaces are available between 6.00pm and 7.00pm weekdays on streets surrounding Waverley Park.

The majority of the SCAPE study recommendations related to internal issues within Waverley Park, however, those relevant to the *Park Parade Traffic and Parking Study* include:

- Provision of a 'kiss and ride' facility to serve Waverley Park.
- Waverley Council Chambers car park be made available for public parking at weekends and after 6.00pm on weekdays.
- Council develop a Transport Access Guide for Waverley Park that can be posted on Council's website and linked to sporting club websites.
- Council encourage 'ridesharing' by posting a rideshare page on Council's website.
- Parking supply should be used to promote more sustainable travel habits through the constraint of destination parking supply.

The *Waverley Park Pavilion Traffic and Parking Study* concluded that no additional land should be required for car parking as a result of the proposed new pavilion and amenities block.

Submission - Waverley Park Draft Master Plan (Waverley Park Master Plan Residents Subcommittee 2009)

The Waverley Park Master Plan Residents Subcommittee² lodged a submission with Council outlining their concerns in response to the *Waverley Park Draft Master Plan*. The submission provides comments on:

- The *Waverley Park Master Plan*.
- The proposed new pavilion.
- The proposals for the south-west corner of the park, i.e. new amenities building and netball courts.

The subcommittee concluded that demand for parking will be significantly increased by the proposed facilities in the Master Plan and DA (i.e. the new pavilion).

Recommendations contained in the submission, relevant to the *Park Parade Traffic and Parking Study*, include:

- Park Parade should be converted to one-way traffic flow with parking created on the western side. The submission suggested that this may require Bennett Street to be made one-way or a right turn be permitted into Council Street.
- Introduce timed resident parking (resident parking permit scheme) on all streets surrounding the park.
- Eliminate the proposed 'kiss and ride' zone from the Master Plan.

² Formed by members of the Penkivil Precinct Committee

Issues Paper – Conversion of Park Parade to One-Way Traffic Flow (Penkivil Precinct Executive 2009)

The Penkivil Precinct Executive prepared a comprehensive issues paper examining the suggestion to provide one-way traffic flow on Park Parade. The paper outlined the advantages and disadvantages of both northbound and southbound one-way options and the possible impacts of those options on Park Parade residents. In addition, it was recommended that the following matters require consideration:

- **Through traffic.** Park Parade, Bennett Street and Ocean Street South were identified as carrying significant volumes of through traffic between Bondi Road and Birrell Street. In order, therefore, to assess the impacts of converting Park Parade to one-way traffic flow on adjacent streets, the collection of traffic data was recommended to “*quantify daily and peak traffic flows as well as identifying any other significant flow directions*” (Penkivil Precinct Executive 2009, p.1).
- **Residential access.** Residents currently have access in all directions from Park Parade and the impact of a one-way restriction will require some additional travel to reach a destination. The issues paper suggests that a resident survey be undertaken to determine the preferred direction of a one-way restriction on Park Parade.
- **Caltex service station access.** The issues paper discusses access restrictions to and from the service station on the corner of Bondi Road and Park Parade and the need to consult with the service station operator.
- **Parking demand.** In view of the large number of Park Parade properties which have off-street parking, the issues paper suggests that an assessment be undertaken to determine the number of parking permits which could be applied for should a Resident Parking Permit Scheme be introduced.
- **Parking layout.** The issues paper identifies a number of parking layouts which could be adopted in conjunction with a one-way system on Park Parade.

Report to Waverley Local Traffic Committee - Introduction of Residential Preferential Parking (Waverley Council 2008)

This report to the Waverley Local Traffic Committee was in response to a petition from residents of Ewell Street, Bennett Street and Ocean Street requesting the introduction of a Resident Parking Permit Scheme (RPPS). In preparing the report, Council also undertook a survey of the residents of Bennett Street, Ewell Street, King Street, Ocean Street South, **Park Parade** and Stephen Street to determine the level of support for a RPPS on their streets. The results of the resident survey are contained in **Figure 2.1**:

Figure 2.1: RPPS survey results

Residential Preferential Parking Survey - RPPS 27					
Street	No. of Responses	Total properties	Response Rate (%)	YES Response (of total RESPONSES) (%)	YES Responses (of total PROPERTIES) (%)
Bennett Street	30	217	14	27	4
Birrell Street	7	25	28	0	0
Ewell Street	10	18	56	70	39
King Street	6	18	33	67	22
Ocean Street South	20	59	34	30	10
Park Parade	21	79	27	29	8
Stephen Street	11	17	65	9	6
TOTAL	105	433	24	30	7

Source: Waverley Council 2008

Due to the low response rate and lack of support, the Local Traffic Committee and Council did not proceed with the introduction of an RPPS on the streets under consideration.

3 METHODOLOGY

3.1 TRAFFIC ISSUES

The following tasks were undertaken in order to collect and analyse current traffic data for Park Parade and adjacent streets:

- Traffic volume, speed and classification survey (tube counter) on Park Parade.
- Intersection surveys (turning movement counts) at key intersections.
- SIDRA intersection modelling at key intersections.
- Analysis of crash statistics (2004 – 2009) for Park Parade and adjacent streets.

3.1.1 Traffic Volume, Speed and Classification Survey

A traffic volume, speed and classification survey on Park Parade was undertaken by CFE Information Technologies, on behalf of **gtk consulting**, between Friday 23 July and Friday 30 July 2010.

The following information was recorded during the survey period (refer **Appendix 1**):

- Hourly, daily and weekly traffic volumes by direction.
- The speed of each vehicle travelling on Park Parade.
- The classification (type) of each vehicle travelling on Park Parade according to axle spacing.

The traffic volume, speed and classification survey data is summarised and discussed in **Section 4.1**.

3.1.2 Intersection Surveys

Intersection surveys (turning movement counts) were undertaken by **gtk consulting** during July and August 2010 at the following intersections:

- Park Parade and Bondi Road
- Park Parade and Birrell Street
- Ocean Street and Bondi Road
- Ocean Street and Birrell Street
- Bennett Street and Bondi Road
- Bennett Street and Birrell Street

The intersection surveys captured all vehicle turning movements for each leg of an intersection and were recorded every 15 minutes, for a 2 hour period, in the morning and afternoon. No surveys were undertaken on days immediately prior to or after a public holiday, during school holidays or on rainy days.

The commencement and finishing times of the surveys were chosen following site observations. It was evident from the survey information collected that there are differing peak times for individual streets within the study area. This is not an unusual occurrence as streets within a road network serve different purposes (refer **Section 4.3**). Streets within the study area are used for travel to work, school and commercial/retail areas. The highest number of vehicles in any given hour (peak hour) during the morning and afternoon periods, for the majority of streets within the study area, occurred between the hours of 7.00am - 9.00am and 4.00pm - 6.00pm.

The intersection surveys, undertaken by **gtk consulting** during July and August 2010, represent the most up-to-date traffic information available (refer **Appendix 2**)

Analysis of the intersection turning movement data is contained in **Section 4.2**.

3.1.3 Intersection Modelling

In order to determine the existing performance of key intersections within the study area and the impact of any changes to traffic arrangements on Park Parade, intersection modelling was undertaken using the SIDRA traffic modelling program.

Existing Intersection Performance

SIDRA modelling of the intersections surveyed by **gtk consulting** in July and August 2010 was undertaken to establish existing intersection performance and level of service. SIDRA movement summaries are reproduced in **Appendix 3**; intersection performance details are summarised and discussed in **Section 4.4**.

Impact of Park Parade One-Way Proposals

A one-way traffic flow on Park Parade was suggested during the consultation undertaken for the *Waverley Park Master Plan* and the *Waverley Park Pavilion and Amenities Block Development Application*.

Further SIDRA modelling of the northbound and southbound options was undertaken to determine the impact of one-way traffic flows redirected from Park Parade to the following intersections:

- Ocean Street and Bondi Road
- Ocean Street and Birrell Street
- Bennett Street and Bondi Road
- Bennett Street and Birrell Street

SIDRA movement summaries for the option testing are reproduced in **Appendix 4** (northbound one-way option) and **Appendix 5** (southbound one-way option).

The impacts of one-way Park Parade traffic flows on the surrounding road network, as determined by the SIDRA analysis, are discussed in **Section 5.1 and 5.2**.

3.1.4 Crashes within Study Area

RTA crash data (April 2004 – March 2009³) was obtained for Park Parade and adjacent streets (refer **Appendix 6**). An analysis of this data (contained in **Section 4.5**) was undertaken:

- To examine the recent crash history of Park Parade and adjacent streets.
- To ensure traffic flows are not redirected to locations with unsatisfactory crash histories.
- To determine whether there is a pedestrian crash history on Park Parade.

³ The most recent data obtainable from the RTA Crash Analysis Unit

3.2 PARKING ISSUES

Council provided parking accumulation surveys of streets immediately adjacent to Waverley Park. The surveys were undertaken by TTM in February and April 2009 as part of the *Waverley Park Pavilion Traffic and Parking Study* and provide a measure of the existing on-street parking demand at those times.

The TTM surveys involved observations of on-street parking every hour between 8.00am and 7.00pm, collecting the following information:

- The number of vehicles that can legally park on a given length of a street (parking supply).
- The number of vehicles legally parking in the street (parking demand).

The parking accumulation survey data collected by TTM for the 52 unrestricted car parking spaces on Park Parade is contained in **Appendix 7**, and discussed in **Section 4.6**.

4 EXISTING TRAFFIC AND PARKING CONDITIONS

4.1 PARK PARADE TRAFFIC VOLUME, SPEED AND CLASSIFICATION SURVEY

A traffic volume, speed and classification survey was undertaken by CFE Information Technologies on Park Parade between Friday 23 July and Friday 30 July 2010.

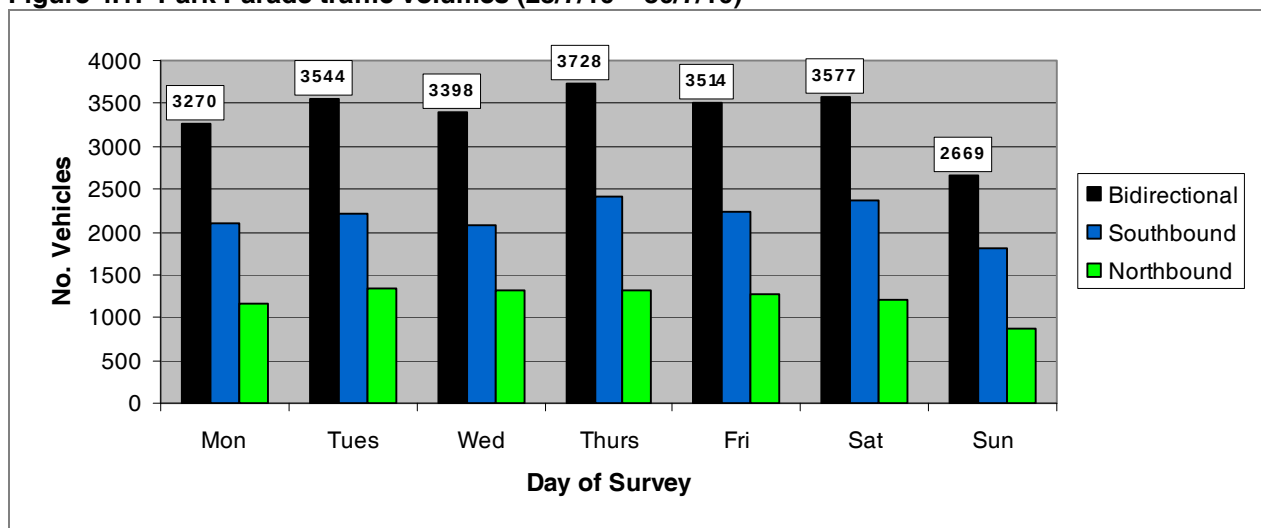
4.1.1 Traffic Volumes

Traffic volume survey data is reproduced in **Appendix 1** as follows:

- **Figure A1.1**, bidirectional traffic volumes
- **Figure A1.2**, southbound traffic volumes
- **Figure A1.3**, northbound traffic volumes

A total of 23,700 vehicles travelled along Park Parade during the survey period, 15,197 (64%) southbound and 8,503 (36%) northbound. The dominant southbound traffic flow is illustrated in **Figure 4.1**:

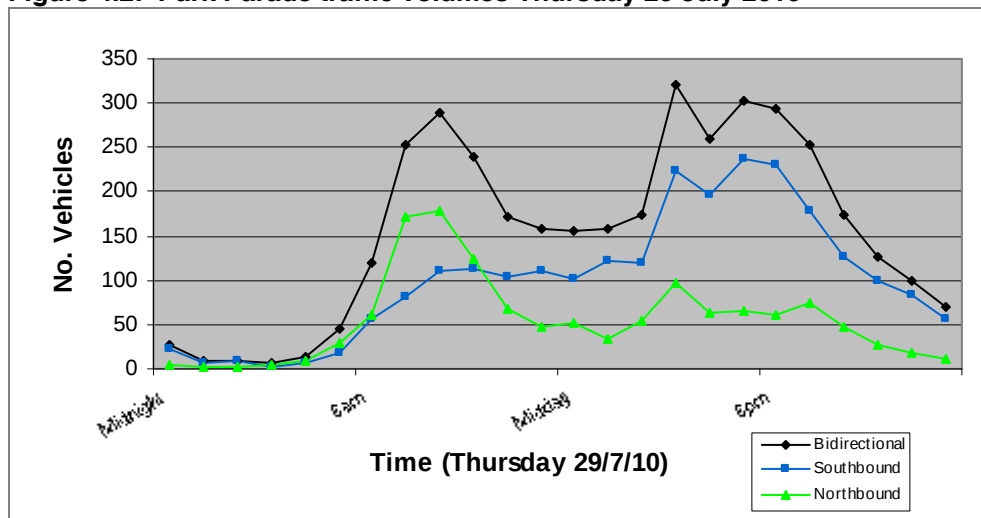
Figure 4.1: Park Parade traffic volumes (23/7/10 – 30/7/10)



Source: CFE Information Technologies 2010

The highest daily traffic volume (3,728 vehicles) was recorded on Thursday 29 July 2010, the hourly traffic volumes for which are shown in **Figure 4.2**. The graph clearly demonstrates the AM and PM peak periods and the dominant southbound traffic flow between 10.00am and midnight. The dominant northbound traffic flow during the AM peak period is attributable to commuters travelling from Bronte and Tamarama to Bondi Junction and other destinations via Sid Einfeld Drive. The PM peak period represents the reverse travel pattern.

Figure 4.2: Park Parade traffic volumes Thursday 29 July 2010



Source: CFE Information Technologies 2010

4.1.2 Vehicle Speeds

Vehicle speed data for the survey period is reproduced in **Appendix 1** as follows:

- **Figure A1.4**, southbound vehicle speeds
- **Figure A1.5**, northbound vehicle speeds

A vehicle speed summary for Park Parade is provided in **Table 4-1**:

Table 4-1: Park Parade vehicle speed summary (23/7/10 – 30/7/10)

Speed (km/h)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120
No. Vehicles	70	153	535	2418	9730	8897	1643	189	37	16	7	2
% Vehicles	0.3%	0.6%	2.3%	10.2%	41.1%	37.5%	6.9%	0.8%	0.2%	0.1%	0.03%	0.01%

Source: CFE Information Technologies 2010

The speed zone on Park Parade is 50km/h. During the week of survey, 46% of vehicles were recorded travelling in excess of the speed limit, with 9 vehicles registering speeds greater than 100km/h.

Park Parade has an 85th percentile speed of 58km/h. 85th percentile speed is a term used to describe the operating speed of a road and is commonly used to determine speed limits. 50km/h residential speed zones were introduced in NSW in an effort to reduce crash rates and thereby improve safety for all road users. The existing Park Parade road environment contributes to an 85th percentile speed greater than the 50km/h speed limit and includes factors such as:

- 404 metres of straight carriageway between intersections.
- Parking permitted on the eastern side of the carriageway only.
- Open space i.e. Waverley Park, on the western side of the carriageway.

In order to reduce vehicle speeds on Park Parade, it will be necessary to change the road environment. This can be achieved with the installation of speed management devices, line-marking and changes to parking arrangements, the details of which are discussed in **Section 5**.

4.1.3 Vehicle Classification

Vehicle classification data for the survey period is reproduced in **Appendix 1** as follows:

- **Figure A1.6**, southbound vehicle classification
- **Figure A1.7**, northbound vehicle classification

The results of the vehicle classification survey are summarised in **Table 4-2** and indicate that 98% of vehicles travelling along Park Parade, during the survey period, were assigned to Vehicle Class 1 i.e. cars and motorcycles.

Table 4-2: Park Parade vehicle classification summary (23/7/10 – 30/7/10)

Vehicle Class	Vehicle Description	No. Vehicles
1	Car, van, wagon, 4WD, utility, bicycle, motorcycle	23,062
2	Car towing trailer, caravan, boat	60
3	2 axle truck or bus	331
4	3 axle truck or bus	71
5	4 axle truck	11
6	3 axle articulated	6
7	4 axle articulated	14
8	5 axle articulated	2
9	6 axle articulated	4
10	B-Double (7+ axles)	0
11	Double road train	0
12	Triple road train	0
13	Unidentified/error ⁴	125

Source: CFE Information Technologies 2010

⁴ Unknown axle configuration or recording error

4.2 STUDY AREA TRAFFIC VOLUMES

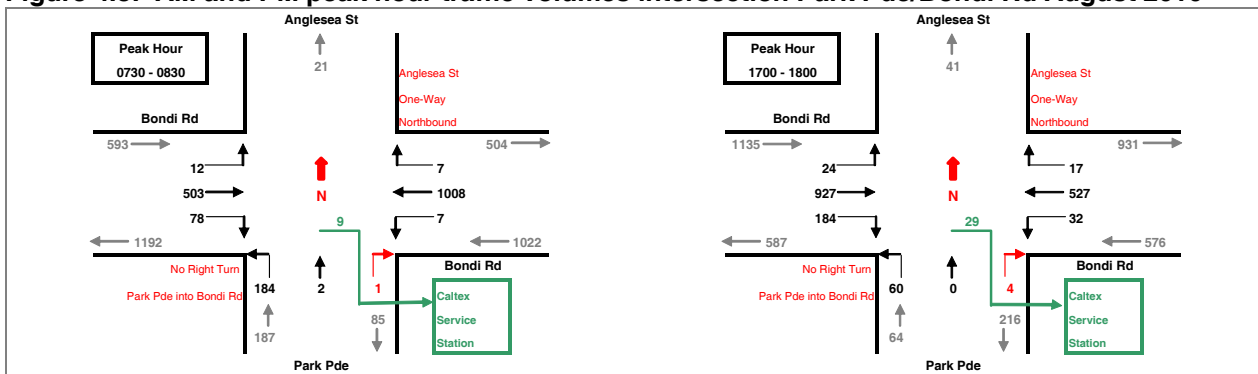
4.2.1 Intersection Surveys

Intersection surveys (turning movement counts) were undertaken by **gtk consulting** during July and August 2010 at the following intersections (refer **Appendix 2**):

- Park Parade and Bondi Road
- Park Parade and Birrell Street
- Ocean Street and Bondi Road
- Ocean Street and Birrell Street
- Bennett Street and Bondi Road
- Bennett Street and Birrell Street

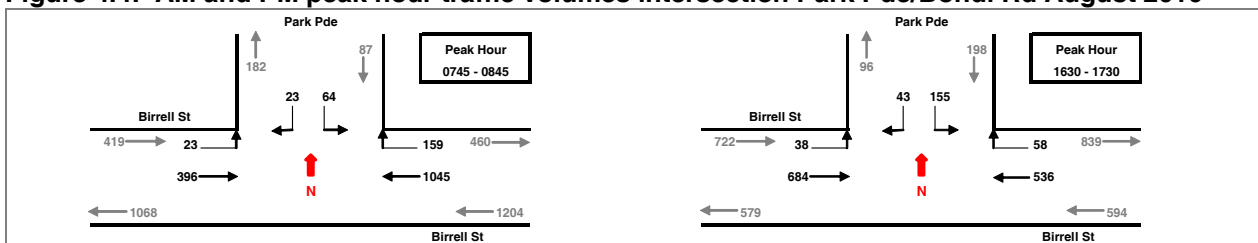
The AM and PM peak hour turning movements recorded for Park Parade intersections are reproduced in **Figure 4.3** (Park Pde/Bondi Rd) and **Figure 4.4** (Park Pde/Birrell St):

Figure 4.3: AM and PM peak hour traffic volumes intersection Park Pde/Bondi Rd August 2010



Source: gtk consulting 2010

Figure 4.4: AM and PM peak hour traffic volumes intersection Park Pde/Bondi Rd August 2010



Source: gtk consulting 2010

The turning movement diagrams for Park Parade demonstrate dominant northbound AM peak and southbound PM peak traffic flows. Park Parade, therefore, provides a preferred through traffic route for commuters travelling between Bronte/Tamarama and Bondi Junction (and other destinations via Sid Einfeld Drive).

A Caltex service station is located on the south-eastern corner of the Park Parade/Bondi Road intersection. Access to the service station for eastbound Bondi Road traffic is via a right turn from Bondi Road into Park Parade, followed by a left turn into the service station driveway⁵. While conducting the Park Parade/Bondi Road intersection survey, 9 vehicles during the AM peak and 29 vehicles in the PM peak were observed gaining access to the service station in this way⁶. This represents 11.5% of all vehicles turning right from Bondi Road into Park Parade in the AM peak and 16% in the PM peak.

⁵ A concrete median prevents right turn movements from Bondi Road into the service station for eastbound traffic

⁶ Shown with a green arrow in **Figure 4.3**.

4.2.2 Study Area Traffic Volumes

AM and PM peak hour traffic volume data, recorded during the intersection surveys described in **Section 4.2.1** is summarised in **Table 4-3**:

Table 4-3: AM & PM peak hour traffic volumes (July & August 2010)

Road	Location	AM Peak Hour (veh/h)	PM Peak Hour (veh/h)
Park Pde	North of Birrell St intersection	269	294
Bennett St	North of Birrell St intersection	622	531
Ocean St Sth	South of Bondi Rd intersection	386	310
Bondi Rd	West of Park Pde intersection	1785	1722
	West of Bennett St intersection	1779	1615
	West of Ocean St Sth intersection	1529	1680
Birrell St	West of Park Pde intersection	1487	1301
	West of Bennett St intersection	1666	1424
	West of Ocean St Sth intersection	1203	1038

Source: gtk consulting 2010

The AM and PM peak hour traffic volumes reported in **Table 4-3** are compared against functional classification and environmental capacity criteria in **Section 4.3.2** to determine the existing operation of roads within the study area.

4.3 ROAD NETWORK AND CLASSIFICATION

The purpose of a road network is to provide for the safe and efficient movement of people and goods. The road network provides access to land use activities, through traffic connection and may provide on-street parking. It supports economic development and the social functioning of the community and provides a structure around which a built environment can be formed.

Road users include passenger, freight and commercial vehicles, buses, motorcycles, bicycles and pedestrians. While these users are varied, they share a common desire for safe, efficient and reliable movement through the road network. In order to manage the road network in response to the needs and impacts of these users, road authorities such as Councils classify roads according to their function or purpose. The road classification system recognises the needs of different road users and the transport and non-transport functions of roads. It recognises the wide range and balance between mobility and access on the road network. This is largely driven by the relationship between the road network and the land use it serves. Not all roads can cater effectively for all road user needs nor perform all functions efficiently. It is therefore important that roads are managed according to a functional hierarchy while considering their intended purpose. This approach ensures the achievement of an appropriate balance between movement and access on the road network.

4.3.1 Classification Criteria

Roads carrying higher traffic volumes are generally State Arterial Roads whereas those roads with lesser volumes are Collector and Local Roads. The study area encompasses roads of varying classifications. The three methods used to classify roads in NSW are:

- Functional classification
- Funding classification
- Classification by environmental capacity

Functional Classification

The Roads and Traffic Authority NSW (RTA) has published guidelines for the classification of roads using a functional system (RTA 1991, pp.1-2 to 1-11). This system is based on an assessment of traffic volumes, composition and management. The existing characteristics of the road are compared with a number of criteria which are summarised in **Table 4-4**.

The functional classification system should not be used as a rigid guideline. There are many instances where through traffic and local neighbourhood shops attract a higher portion of traffic using the local road system. It is desirable, however, to minimise traffic using residential streets.

Table 4-4: Functional classification system

	Arterial	Sub-Arterial	Collector	Local
Traffic Volume (veh/h)	>1,500	500-2,000	200 – 1,000	< 200
Traffic Composition				
Through Traffic	Yes	Yes	Little	No
Local Traffic	No	No	Yes	Yes
Commercial Vehicles	Yes	Yes	No	No
Local Delivery Vehicles	Yes	Yes	Yes	Yes
Buses	Yes	Yes	Yes	Maybe
Bicycles lanes	No	Maybe	Yes	Yes
Parking				
Peak period	No	Yes	Yes	Yes
Off Peak	No	Yes	Yes	Yes
Period parking	No	Maybe	Yes	Yes
Unrestricted	No	No	Maybe	Yes
Angle parking	No	No	Maybe	Yes
Intersection control	Yes	Yes	Maybe	Maybe
Bus and Transit lanes	Yes	Yes	Maybe	No
Pedestrian crossings	Controlled	Controlled	Controlled	No
Speed Limit	60+	60	50/60	50
Lane & separation lines	Yes	Yes	Maybe	No
Medians	Yes	Maybe	Maybe	No
Road closures	No	No	Maybe	Maybe

Source: Adapted from RTA 1991

Funding Classification

In addition, the RTA has also adopted a classification system related to the funds allocated to roads. This system classifies roads according to the funding provided by the RTA as follows:

- **State Roads** – roads which perform a state function and therefore receive one hundred percent funding from the RTA. Essentially, these are arterial roads.
- **Regional Roads** – roads that perform a regional function for which the RTA and Council each contribute fifty percent towards funding. These are essentially sub-arterial roads.
- **Local Roads** – roads that perform a collector or local function, which are one hundred per cent Council funded.

In general, the RTA is responsible for the state road network and Councils are responsible for the regional and local road systems. The RTA has an input into the management of local and regional road systems through local traffic committees. Councils must comply with the requirements of delegations granted to them by the RTA for the control and management of regional and local road systems.

Environmental Capacity

The RTA has also published guidelines which provide advice for the assessment of environmental capacity for streets with direct access to residential properties (RTA 2002, p.4-7). These guidelines were developed following considerable research and have taken into account residents' attitudes to traffic in their streets. The guidelines are summarised in **Table 4-5**.

Table 4-5: RTA recommended environmental capacity performance standards for residential streets, i.e. local & collector roads

Road Class	Road Type	Maximum Speed (km/h)	Maximum Peak Hour Volume (veh/h)
Local	Access way	25	100
Local	Street	40	200 environmental goal 300 environmental maximum
Collector	Street	50	300 environmental goal 500 environmental maximum

Source: RTA 2002

Two sets of performance standards have been recommended for the maximum peak hour volume in **Table 4-5**. The first indicates the desirable maximum and the second denotes the absolute maximum. For example, the desirable maximum number of vehicles per hour (veh/h) for a local street is 200 veh/h and the absolute maximum is 300 veh/h. However, it is acknowledged that there are some streets that carry volumes greater than the recommended absolute maximum due to their location and connectivity within the road network.

4.3.2 Classification of Streets in the Study Area

Current AM and PM peak hour traffic volumes for roads in the study area are reported in **Section 4.2.2 (Table 4-3)**. These are compared against functional classification and environmental capacity criteria in **Table 4-6** and indicate that all roads within the study area are operating within acceptable limits for these criteria.

Table 4-6: Operation of roads within study area in relation to functional classification and environmental capacity

Road	Location	AM Peak Hour (veh/h)	PM Peak Hour (veh/h)	Functional Classification	Functional Classification Volumes (veh/h)	Environmental Capacity (veh/h)
Park Pde	North of Birrell St intersection	269	294	Local	<200	200 - 300
Bennett St	North of Birrell St intersection	622	531	Sub-Arterial	500 - 2000	N/A
Ocean St Sth	South of Bondi Rd intersection	386	310	Collector	200 - 1000	300 - 500
Bondi Rd	West of Park Pde intersection	1785	1722	Arterial	>1500	N/A
	West of Bennett St intersection	1779	1615	Arterial	>1500	N/A
	West of Ocean St Sth intersection	1529	1680	Arterial	>1500	N/A
Birrell St	West of Park Pde intersection	1487	1301	Sub-Arterial	500 - 2000	N/A
	West of Bennett St intersection	1666	1424	Sub-Arterial	500 - 2000	N/A
	West of Ocean St Sth intersection	1203	1038	Sub-Arterial	500 - 2000	N/A

Source: gtk consulting 2010

4.4 EXISTING INTERSECTION PERFORMANCE

SIDRA intersection modelling was undertaken to determine the existing performance and level of service of the following intersections:

- Park Parade and Bondi Road
- Park Parade and Birrell Street
- Ocean Street and Bondi Road
- Ocean Street and Birrell Street
- Bennett Street and Bondi Road
- Bennett Street and Birrell Street

The SIDRA program determines the average delay of vehicles, the degree of saturation and the level of service of approach roads to the intersections. The degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach road. For roundabouts and sign controlled intersections, e.g. stop and give-way signs, the delay examined is the delay for the worst performing movement at the intersection. For signalised intersections the delay examined is the average of all movements at the intersection. Average delay is expressed in seconds per vehicle.

The SIDRA modelling program determines the operation and level of service of intersections utilising performance criteria set out in **Table 4-7**:

Table 4-7: SIDRA level of service criteria

Level of Service (LOS)	Av. Delay per Vehicle (secs/veh)	Signals & Roundabouts	Give Way & Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity: At <i>signals</i> , incidents will cause excessive delays <i>Roundabouts</i> require other control mode	At capacity, requires other control mode
F	>70	Extra capacity required	Extreme delay, traffic signals or other major treatment required

Source: RTA 2002

Table 4-8 summarises the results of SIDRA modelling for the existing AM Peak and **Table 4-9**, the existing PM peak:

Table 4-8: SIDRA results existing AM peak

Intersection	Dem. Flow (veh/h)	Deg. of Saturation (v/c)	Av. Delay (sec)	Level of Service (LOS)	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Av. Speed (km/h)
Park Pde & Bondi Rd (Give-Way)	1801	0.667	4.3	A/B	25	0.36	0.17	44.7
Park Pde & Birrell St (Give-Way)	1710	0.333	2.2	A/B	25	0.22	0.12	46.9
Bennett St & Bondi Rd (Signalised)	2473	0.804	33.1	C	174	0.85	0.78	27.8
Bennett St & Birrell St (Signalised)	1821	0.629	17.3	B	82	0.83	0.72	35.2
Ocean St Sth & Bondi Rd (Signalised)	1888	0.748	22.0	B	130	0.61	0.56	32.6
Ocean St Sth & Birrell St (Give-Way)	1319	0.403	4.4	A/B	41	0.46	0.17	51.7

Source: gtk consulting 2009

Table 4-9: SIDRA results existing PM peak

Intersection	Dem. Flow (veh/h)	Deg. of Saturation (v/c)	Av. Delay (sec)	Level of Service (LOS)	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Av. Speed (km/h)
Park Pde & Bondi Rd (Give-Way)	1775	0.333	4.2	A/B	33	0.43	0.15	45.1
Park Pde & Birrell St (Give-Way)	1514	0.478	4.7	A/B	39	0.40	0.19	44.6
Bennett St & Bondi Rd (Signalised)	2145	0.894	33.6	C	226	0.84	0.79	27.6
Bennett St & Birrell St (Signalised)	1554	0.582	16.6	B	133	0.65	0.61	35.7
Ocean St Sth & Bondi Rd (Signalised)	1963	0.702	9.8	A	53	0.23	0.26	40.4
Ocean St Sth & Birrell St (Give-Way)	1128	0.291	3.3	A/B	18	0.30	0.15	54.0

Source: gtk consulting 2010

These results indicate that the majority of intersections surveyed in the study area are operating at a good level of service. However, it should be noted that the signalised intersections at Bondi Road/Bennett Street and Bondi Road/Ocean Street have a number of approaches currently operating near or at capacity i.e. LOS D or E (refer **Table 4-10**).

Table 4-10: SIDRA LOS – intersection approaches Bondi Rd/Bennett St & Bondi Rd/Ocean St

Intersection	Approach	AM Peak LOS	PM Peak LOS	Comments
Bondi Rd/Bennett St	Bennett St (south)	E	E	Right turn LOS F in PM peak
	Penkivil St (north)	D	D	Left turn LOS E in PM peak
Bondi Rd/Ocean St	Ocean St (south)	E	E	
	Ocean St (north)	D	E	

Source: gtk consulting 2010

Detailed SIDRA modelling results for each intersection are contained in **Appendix 3**.

4.5 CRASHES WITHIN STUDY AREA

A total of 65 road crashes occurred within the study area between April 2004 and March 2009, 85% of which were located at intersections (refer **Appendix 6**). A plan of road crashes for the study area is shown overleaf (**Figure 4.5**).

Bondi Road and Birrell Street account for 75% of all crashes recorded. Injuries (including 1 fatality) were sustained in 57% of crashes (refer **Table 4-11**).

Table 4-11: Study area casualty statistics (2004 – 2009)

Street Name	No. Crashes	No. Fatal Crashes	No. Injury Crashes	No. Non-Casualty Crashes
Bondi Rd	38	0	22	16
Birrell St	11	0	7	4
Bennett St	8	0	5	3
Ocean St Sth	4	1	1	2
Park Pde	4	0	1	3
Totals	65	1	36	28

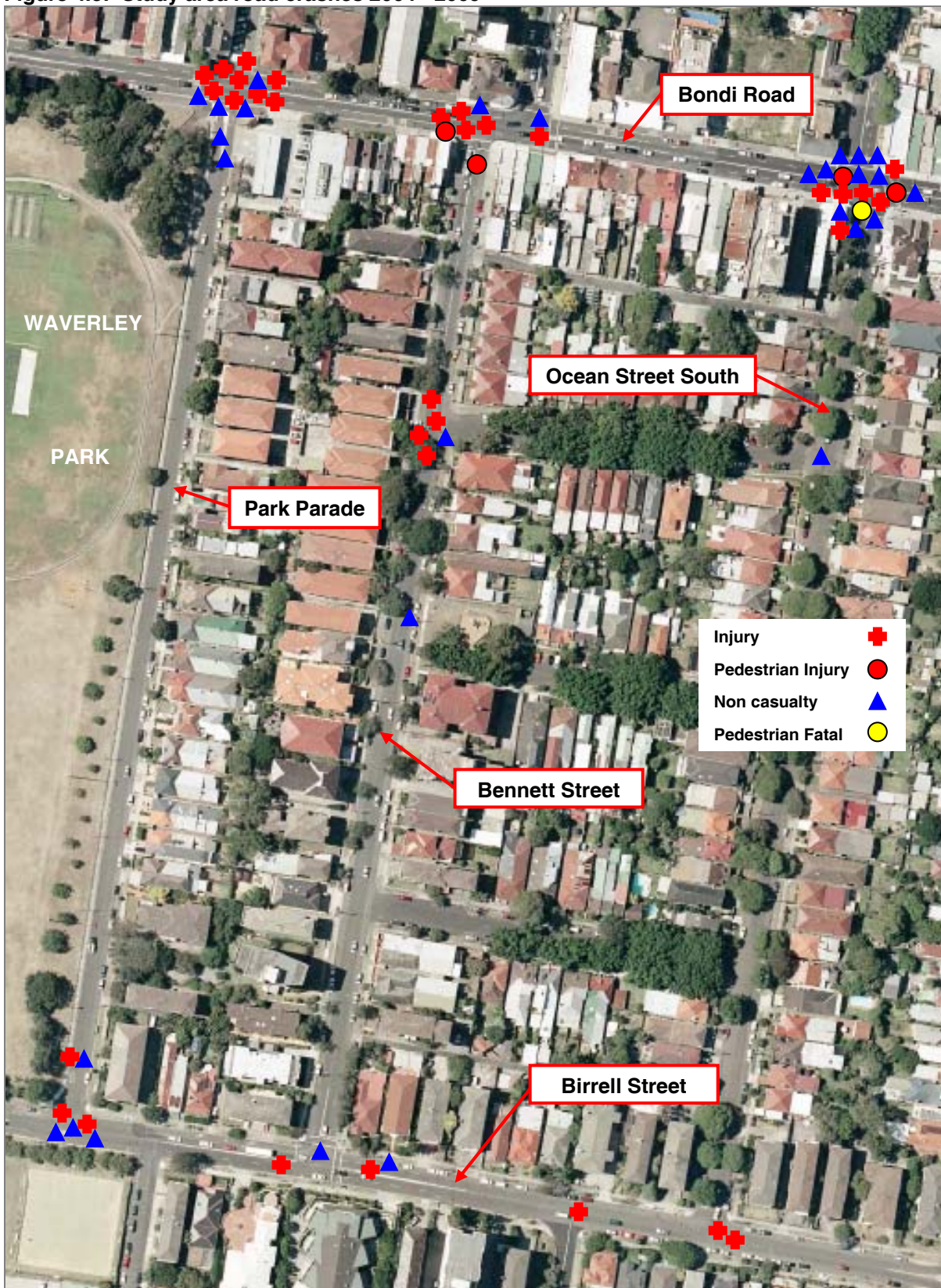
Source: RTA Crash Analysis Unit 2010

Four mid block crashes occurred on Park Parade during the period examined, including 3 non-casualty crashes involving collisions with parked vehicles. No pedestrian crashes were recorded on Park Parade.

Cars account for the majority of crash vehicles, however, it is noted that 9 motorcycles, 7 pedal cycles and 6 pedestrians were involved in road crashes. The pedestrian crashes occurred at the following locations:

- 2 at the intersection of Bondi Road and Ocean Street;
- 2 at the intersection of Bondi Road and Bennett Street;
- 1 on Bennett Street at the intersection of Bondi Road; and
- 1 pedestrian fatality on Ocean Street South at the intersection of Bondi Road.

Figure 4.5: Study area road crashes 2004 - 2009



Source: gtk consulting 2010

4.6 PARKING

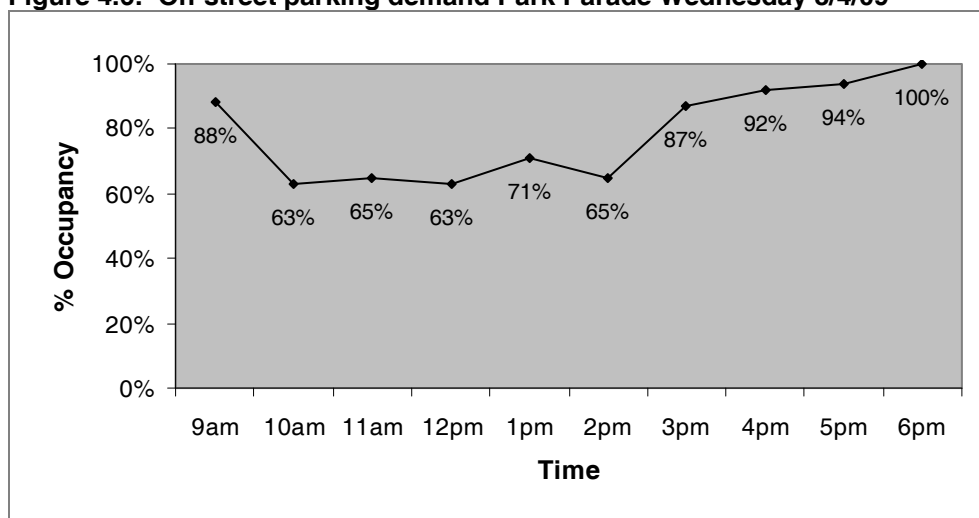
There are currently 52 parallel car parking spaces on the eastern side of Park Parade; 51 unrestricted and 1 space for persons with a disability. A 'No Stopping' restriction applies on the western side of Park Parade between Bondi Road and Birrell Street, a distance of 404 metres.

Observations made by **gtk consulting**, while conducting the fieldwork for this study, indicated that the majority of parked vehicles on Park Parade were associated with adjacent residences as revealed by an 87% - 90% occupancy rate between 6.00am and 7.00am weekdays. Similar occupancy rates were maintained throughout the day. Significant 'kiss and drop' activity associated with sport training was also noted after 3.00pm (mainly on Birrell Street between Park Parade and Henrietta Street).

Parking accumulation surveys, undertaken by TTM for the *Waverley Park Pavilion Traffic and Parking Study* (SCAPE 2009) were provided by Council for inclusion in this study (refer **Appendix 7**). The 2009 surveys were undertaken on a weekday in April and a Saturday in February. The TTM parking surveys were conducted on 9 streets⁷ adjacent to Waverley Park and the Council Chambers car park.

The April 2009 survey indicated moderate to high parking occupancy rates on Park Parade throughout the day (refer **Figure 4.6**). Maximum occupancy rates (92% - 100%) occurred after 4.00pm and were attributed to sport training in the SCAPE study.

Figure 4.6: On-street parking demand Park Parade Wednesday 8/4/09

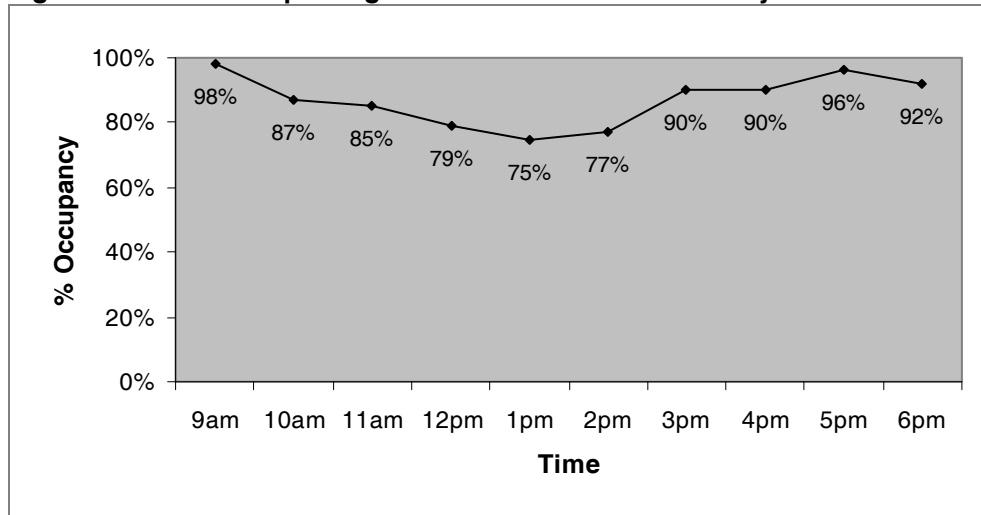


Source: TTM 2009

⁷ Birrell St, Bondi Rd, Council St, Dalley St, Goldie St, James St, **Park Pde**, Paul St, St Marys Ave.

The survey conducted on Saturday 21 February 2009 demonstrates similar moderate to high parking occupancy rates on Park Parade (refer **Figure 4.7**).

Figure 4.7: On-street parking demand Park Parade Saturday 21/2/09



Source: TTM 2009

As discussed in **Section 2**, Council undertook a survey of the residents of Bennett Street, Ewell Street, King Street, Ocean Street South, **Park Parade** and Stephen Street in 2008 to determine the level of support for the introduction of a RPPS on their streets. Only 29% of Park Parade residents who responded to the survey supported the introduction of an RPPS⁸.

⁸ Representing 8% of all Park Parade properties.

5 PARK PARADE TRAFFIC MANAGEMENT AND PARKING OPTIONS

During the preparation of the *Waverley Park Master Plan* and the *Waverley Park Pavilion and Amenities Block Development Application* the following proposals were put forward to improve traffic management and car parking on Park Parade:

- One-way northbound traffic flow with angle parking on one side of the road.
- One-way southbound traffic flow with angle parking on one side of the road.
- Widen carriageway on western side (i.e. Waverley Park side) to provide a parking lane and maintain two-way traffic flow.
- One-way traffic flow with a combination of angle and parallel parking.
- Provision of pedestrian crossings.
- Provision of a 'kiss and drop' zone.

A carriageway width of 9.00 metres⁹ on Park Parade limits parking to one side of the road only. The Australian Standard, AS2890.5–1993 *Parking facilities – Part 5: On-street parking*, sets the minimum dimensions for parking lanes on public roads. The standard requires a minimum parking lane width of 2.6 metres on Park Parade, leaving the remaining width of 6.40 metres available for two-way traffic. The desirable lane width for two-way urban roads is 3.50 metres, however, the RTA *Road Design Guide* allows a minimum lane width of 2.80 metres adjacent to a parking lane and 3.25 metres adjacent to a kerb; i.e. a total width of 6.05 metres on urban roads where the width of a road reserve is restricted (RTA 1999, pp.3-8 & 3-9).

5.1 ONE-WAY NORTHBOUND TRAFFIC FLOW WITH ANGLE PARKING ON ONE SIDE OF THE ROAD

The immediate impact of providing one-way northbound traffic flows on Park Parade is the diversion of southbound traffic to adjoining streets; 85 vehicles in the AM peak and 216 vehicles in the PM peak. These traffic volumes were reassigned as follows:

- Left turning vehicles from Bondi Road into Park Parade were redirected to Bennett Street.
- Right turning vehicles from Bondi Road into Park Parade were redirected to Ocean Street South (due to the No Right Turn restriction at Bennett Street).

⁹ Width between kerbs

To determine the impact of the reassigned traffic, a SIDRA analysis of the intersections potentially affected by the implementation of a northbound Park Parade traffic flow was carried out. The analysis revealed a reduction to the level of service (LOS) for a number of traffic movements, detailed in **Table 5-1**:

Table 5-1: Northbound one-way option – LOS reductions adjacent intersections

Intersection	Movement	Reduction to LOS
Bondi Rd/Bennett St/Penkivil St	Bennett St through to Penkivil St	LOS E → F (PM peak)
	Bondi Rd left into Bennett St	LOS B → C (AM peak)
	Bondi Rd through eastbound at Bennett St	LOS B → C (PM peak)
Birrell St/Bennett St	Birrell St right into Bennett St	LOS A → B (PM peak)
	Birrell St through westbound at Bennett St	LOS A → B (PM peak)
Bondi Rd/Ocean St Sth/Ocean St Nth	Ocean St Nth left into Bondi Rd	LOS D → E (AM peak)
	Ocean St Nth through southbound at Bondi Rd	LOS C → D (AM peak)
	Ocean Street North right into Bondi Rd	LOS D → F (AM peak)
	Bondi Rd through westbound at Ocean St	LOS A → B (AM peak)
	Bondi Rd right into Ocean St Sth	LOS B → C (AM peak)
	Bondi Rd right into Ocean St Sth	LOS A → F (PM peak)

Source: gtk consulting 2010

Level of service reductions for the majority of movements listed in **Table 5-1** are not significant. However, the reduction in level of service (A → F) for right turns from Bondi Road into Ocean Street South will create unacceptable delays and adverse impacts for traffic on Bondi Road in the PM peak. For this reason, a one-way northbound traffic flow on Park Parade should not be pursued unless additional lane capacity can be provided on Bondi Road.

5.2 ONE-WAY SOUTHBOUND TRAFFIC FLOW WITH ANGLE PARKING ON ONE SIDE OF THE ROAD

A southbound one-way traffic flow on Park Parade requires the redirection of northbound traffic; 187 vehicles in the AM peak and 64 vehicles in the PM peak. These traffic volumes were reassigned as follows:

- 80% to Bennett Street
- 20% to Ocean Street

The basis for the above split is that traffic turning right from Birrell Street into Park Parade does so to avoid the constrained traffic flow on Bondi Road. It is assumed that the majority of redirected traffic, under a one-way Park Parade southbound traffic flow option, will use Bennett Street to travel between Birrell Street and Bondi Road. However, as traffic queues increase on Birrell Street for vehicles turning right into Bennett Street, drivers will seek the alternative route via Ocean Street.

The impact of reassigned traffic on adjoining intersections, with the implementation of a southbound Park Parade traffic flow, was assessed using the SIDRA modelling program (refer **Table 5-2**).

Table 5-2: Southbound one-way option – LOS reductions adjacent intersections

Intersection	Movement	Reduction to LOS
Bondi Rd/Ocean St Sth/Ocean St Nth	Ocean St Sth through northbound at Bondi Rd	LOS D → E (PM peak)
	Bondi Rd through eastbound at Ocean St	LOS A → B (AM peak)
Birrell St/Bennett St	Birrell St right into Bennett St	LOS A → B (AM peak)
Bondi Rd/ Bennett St/Penkivil St	Bondi Rd left into Bennett St	LOS B → C (AM peak)
	Bondi Rd through eastbound at Bennett St	LOS B → C (AM peak)
	Bondi Rd right into Penkivil St	LOS C → D (AM peak)
	Penkivil St through southbound into Bennett St	LOS D → F (AM peak)
	Penkivil St right into Bondi Rd	LOS D → F (AM peak)

Source: gtk consulting 2010

A reduction in one LOS is not considered significant enough to warrant limiting or abandoning a proposal. However, further consideration is required where level of service reduces from 'D' (*operating near capacity*) to 'F' (*extra capacity required*), as is the case for several legs of the Bondi Road/Bennett Street/Penkivil Street intersection, i.e.:

- The Penkivil Street southbound 'through' movement into Bennett Street.
- The right turn movement from Penkivil Street into Bondi Road.

Additional capacity could be gained for these movements with the reconfiguration of the Bondi Road/Bennett Street/Penkivil Street intersection to allow through traffic movements from Penkivil Street into Bennett Street from the kerbside lane. This proposal will require adjustment to the kerb radius and shop awning on the south-eastern corner of Bondi Road and Bennett Street and removal of parking on the eastern side of Bennett Street for a suitable distance south of Bondi Road.

As discussed previously, the existing carriageway width of Park Parade (9 metres) limits the options available to provide additional car parking. Factors requiring consideration include:

- Width of parking spaces.
- Width of traffic lanes.
- Vehicle turning requirements to and from residential properties.

The dimensions of car parking spaces are set out in AS2890.5–1993 *Parking facilities – Part 5: On-street parking*, and vehicle turning paths are provided in AS2890.1–2004 *Parking facilities – Part 1: Off-street parking*.

Angle parking generally supplies more parking spaces over a given length of road, however, smaller angles (30 degrees or less) give little advantage over parallel parking particularly where there are frequent driveways and other parking interruptions (AS2890.5–1993, p.7). The width of Park Parade limits the angle parking option to 30 degrees which requires a minimum carriageway width of 8.6 metres. In comparison, the minimum carriageway width for 45 degree angle parking is 10.40 metres.

Another limitation to the implementation of angle parking is the manoeuvring area required for vehicles entering and exiting driveways to the residential properties on the eastern side of Park Parade. Using the vehicle turning templates contained within AS2890.1–2004 it was determined that the provision of angle parking on the western side of Park Parade would restrict access to and from the residential driveways. Consequently, angle parking can only be installed on the eastern side of Park Parade with suitable treatment provided on either side of each driveway to accommodate turning movements. A concept plan showing a typical 30 degree angle parking option and driveway treatment is contained in **Appendix 9**.

Due to the number of driveways on Park Parade the parking gain for a 30 degree angle parking option is possibly as little as 10 spaces, however, this is subject to a detail survey and engineering design.

Parallel parking is the most common form of parking on Australian roads. It has the least width requirements and is, therefore, ideally suited to roads such as Park Parade. The eastern side of Park Parade has existing parallel parking. A one-way southbound traffic flow will make an additional lane available which can be used to provide extra parking on the western (right hand) side of the carriageway adjacent to Waverley Park. Parking on the right-hand side of the carriageway is potentially hazardous for passengers exiting vehicles on the traffic side of the road, but this could be addressed by:

- The installation of speed management devices such as ‘speed cushions’.
- The provision of edge lines delineating a space between parked vehicles and the trafficable area.

A concept plan showing a typical parallel parking option and line-marking treatment is contained in **Appendix 9**.

A parallel parking option on Park Parade will provide an additional 62 parking spaces and is less expensive to install than angle parking.

5.3 WIDEN CARRIAGEWAY ON WESTERN SIDE OF PARK PARADE

One of the submissions received during the consultation for the *Waverley Park Master Plan* and *Waverley Pavilion and Amenities Block Development Application* proposed the widening of Park Parade on the western side, i.e. Waverley Park side, in order to:

- Maintain two-way traffic flow.
- Provide an additional parking lane.

The minimum carriageway width required for this option is 10.80 metres.

Preliminary cost estimates for the widening of Park Parade and the construction of a retaining wall at its northern end is in excess of \$1,000,000. As 62 additional parking spaces can be provided with road widening (the same as for the one-way parallel parking option), the cost of each space is in the order of \$16,000.

5.4 ONE-WAY TRAFFIC FLOW WITH COMBINATION OF ANGLE AND PARALLEL PARKING

The provision of one-way traffic flow with a combination of angle and parallel parking was suggested as a traffic calming measure; achieved by the weaving manoeuvres necessary to negotiate the alternate parking arrangements. It was established in **Section 5.2** that angle parking on Park Parade results in minimal increase to the number of parking spaces. In addition, the transition length (the length required) for a vehicle to shift across the carriageway to a new alignment is 20 metres on either side of the change of parking arrangement. Although these changes could be designed to occur at driveway locations, it is considered that this parking option would result in a reduced number of parking spaces on Park Parade.

5.5 PROVISION OF PEDESTRIAN CROSSINGS

The Penkivil Precinct Executive, in its September 2009 Issues Paper, suggested the installation of two pedestrian crossings on Park Parade, in order to create a traffic calming effect and provide safe crossing locations for pedestrians.

The installation of pedestrian crossings may not necessarily improve the safety of pedestrians crossing a road (Austroads 1995, p.40). Indeed, the inappropriate location of a pedestrian crossing, including an under utilised crossing, may cause an increase in pedestrian crashes.

The installation of pedestrian crossings is subject to 'warrants' set by AS1742.10-2009. The warrant which **must** be achieved requires:

"in two separate one hour periods of a typical weekday, there are no fewer than 60 pedestrians and at least 600 vehicles pass the site, subject to the product of the number of pedestrians per hour and vehicles in the same hour exceeding 90,000."

Park Parade carries traffic volumes in the order of 269 vehicles in the AM peak and 294 in the PM peak. Therefore, in order to satisfy the warrant requirements of AS1742.10-2009 it is necessary for at least 334 pedestrians in the AM peak and 306 pedestrians in the PM peak to cross Park Parade at any proposed pedestrian crossing location.

Observations of Park Parade during the traffic surveys indicate that there are insufficient numbers of pedestrians crossing Park Parade, at any location, to meet the warrants for the provision of a pedestrian crossing.

Improvements to pedestrian safety can be gained by decreasing vehicle speeds and reducing the width of carriageway to be crossed by pedestrians. These improvements can be achieved on Park Parade with the installation of speed control devices, e.g. speed cushions, and a one-way traffic flow.

5.6 PROVISION OF A 'KISS AND DROP' ZONE

The *Waverley Park Pavilion Traffic and Parking Study* (SCAPE 2009) undertaken for the *Waverley Pavilion and Amenities Block Development Application* recommended the establishment of a 'kiss and ride'¹⁰ zone for persons, particularly children, being set down and picked up at Waverley Oval. SCAPE did not make any recommendation on the location of the recommended 'kiss and ride' zone.

While conducting the traffic surveys, **gtk consulting** also observed 'kiss and drop'¹¹ activities in the vicinity of Waverley Park and in particular, Park Parade. These observations indicated that the majority of 'kiss and drop' activity occurred on the northern side of Birrell Street between Park Parade and the existing pedestrian crossing adjacent to Henrietta Street, where there are no parking restrictions. This location has a high parking occupancy rate throughout the day and is predominantly used by residents of nearby flats. Any vacant spaces after 3.00pm were keenly sought by visitors to Waverley Park.

It is noted that the Waverley Park Master Plan Residents Subcommittee's 2009 submission recommended the 'kiss and ride' zone be removed from the *Waverley Park Master Plan*. The subcommittee considered that more parking is required rather than 'kiss and ride' facilities.

The provision of a formal 'kiss and drop' zone will satisfy an existing demand. It can be established on the northern side of Birrell Street, between Park Parade and the existing pedestrian crossing adjacent to Henrietta Street, with the establishment of a No Parking zone after 3.00pm weekdays and on weekends for appropriate time periods. Appropriate time periods for the No Parking zone should be determined in consultation with the Waverley Local Traffic Committee.

¹⁰ 'Kiss & ride' is a facility provided at transport nodes.

¹¹ 'Kiss & drop' is a facility where passengers are set down at a destination.

6 CONCLUSION

The *Park Parade Bondi Traffic and Parking Study* was initiated by Waverley Council following reports and submissions on the *Waverley Park Master Plan* and *Waverley Park Pavilion and Amenities Block Development Application*. The findings and recommendations of the traffic and parking study¹² supporting the development application were accepted by Council and consent was granted in September 2009. Resident submissions received during public consultation for the Draft Master Plan and Development Application raised the issue of insufficient parking provision for Waverley Park. The submissions proposed a number of options to increase parking capacity on Park Parade including road widening and one-way traffic flows.

gtk consulting collected and analysed traffic survey data in order to examine the existing operation of roads and intersections within the study area and determine the potential impacts of one-way Park Parade traffic flow on the surrounding road network. The traffic data indicated that Park Parade is functioning within its classification as a local road, however, the Bondi Road/ Penkivil Street/ Bennett Street and Bondi Road/Ocean Street North/Ocean Street South intersections are operating at, or near capacity. Vehicles speeds on Park Parade were found to be higher than desirable for a residential road, particularly one adjacent to a large recreational area such as Waverley Park.

Analysis of a one-way northbound traffic flow on Park Parade revealed that the impacts of the redirected traffic on the intersections of Bondi Road/Bennett Street/Penkivil Street and Bondi Road/Ocean Street North/Ocean Street South are unacceptable. Analysis of a one-way southbound traffic flow on Park Parade indicated minimal impact on the majority of intersections in the study area with the exception of Penkivil Street at Bondi Road. This impact could be ameliorated with some minor kerb and awning adjustment on the south-eastern corner of Bondi Road and Bennett Street and the provision of pavement marking to permit two lanes of traffic to turn right from Penkivil Street and left into Bennett Street.

The options considered to increase parking capacity on Park Parade include:

- Angle parking combined with a one-way traffic flow.
- Parallel parking combined with a one-way traffic flow.
- Road widening to provide an additional parking lane.
- Combination of angle and parallel parking with a one-way traffic flow.

¹² *Waverley Park Pavilion Traffic and Parking Study* (SCAPE 2009)

An examination of the parking options revealed:

- The width of Park Parade can only accommodate 30 degree angle parking.
- Angle parking can only be located on the eastern side of Park Parade due to turning area requirements for vehicles entering and exiting driveways.
- 30 degree angle parking provides minimal (10) additional parking spaces due to the number of driveways on Park Parade.
- Parallel parking on both sides of Park Parade combined with a one-way traffic flow results in an additional 62 parking spaces.
- The cost of widening Park Parade to provide an additional 62 parking spaces, while maintaining two-way traffic flow, is in excess of \$1,000,000.
- A combination of angle and parallel parking with a one-way traffic flow will result in reduced parking on Park Parade.

The traffic and parking study undertaken for *Waverley Park Pavilion and Amenities Block Development Application* proposed that a 'kiss and ride' zone be established adjacent to Waverley Park. The Waverley Park Master Plan Residents Subcommittee, however, recommended its removal from the *Waverley Park Master Plan*. Observations undertaken by **gtk consulting** confirmed that significant passenger set down and pick up occurs on Birrell Street between Park Parade and Henrietta Street. A 'kiss and drop' zone can be established on the northern side of Birrell Street in this location by installing a No Parking zone after 3.00pm weekdays and on weekends. Appropriate time periods for the No Parking zone can be determined in consultation with the Waverley Local Traffic Committee.

This study has found that a southbound traffic flow on Park Parade can be implemented with minimal impact on the adjoining streets and intersections, subject to minor improvement works being undertaken at the intersection of Bondi Road and Bennett Street. In conjunction with the one-way southbound traffic flow, an additional 62 parallel parking spaces can be established on the western side of Park Parade with edge line delineation of the travelling lane to provide a safe area for passengers exiting parked vehicles.

This report was considered by Waverley Council's Community, Housing, Environmental Services & Public Works Committee Meeting on 2 November 2010. The minutes of the Committee were adopted by the Council on 2 December 2010 (**Appendix 8**).

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Waverley Park Master Plan Residents Subcommittee 2009, *Waverley Park Draft Master Plan*, Submission to Waverley Council Department of Recreation Customer and Community Services, Author, Bondi Junction, NSW.

APPENDIX 1 TRAFFIC VOLUME, SPEED AND CLASSIFICATION SURVEY DATA

Figure A1.1: Traffic volumes (bidirectional) - Park Parade Bondi (23/7/10 – 30/7/10)

Figure A7M - Name Volumes (Bidirectional) - Park Parade Bondi (23/7/10 - 29/7/10)

Count Number	6145	Ref : GTK	Lat/Long : S33 53 42.0 / E151 15 33.8	UBD 26 A-9							
Street	PARK PARADE, BONDI : Between BONDI ROAD & BIRRELL STREET (bidirectional) :										
Location	Midblock House No. 19 ELP SY22651		Carriageway								
TOTAL COUNT MATRIX		Start Date	23-JUL-10	Weekly 50th Percentile Speed	49						
		Start Time	1400	Weekly 85th Percentile Speed	58						
		Duration	7 DAYS	Five Day AADT	3491						
		Interval	1 HOUR	Seven Day AADT	3386						
	MON 26TH	TUE 27TH	WED 28TH	THU 29TH	FRI 23RD / 30TH	SAT 24TH	SUN 25TH	5 Day Total Average		7 Day Total Average	
Midnight - 1am	27	18	32	28	33	74	76	138	28	288	41
1am - 2am	6	6	9	9	19	35	53	49	10	137	20
2am - 3am	7	8	6	10	8	23	44	39	8	106	15
3am - 4am	11	7	9	7	7	30	25	41	8	96	14
4am - 5am	13	16	15	14	17	28	22	75	15	125	18
5am - 6am	43	43	42	46	48	27	24	222	44	273	39
6am - 7am	118	118	127	119	124	46	26	606	121	678	97
7am - 8am	213	214	230	254	220	93	52	1131	226	1276	182
8am - 9am	296	341	288	288	270	138	80	1483	297	1701	243
9am - 10am	191	227	241	239	213	193	135	1111	222	1439	206
10am - 11am	154	169	157	171	158	265	169	809	162	1243	178
11am - Midday	121	142	148	158	166	271	183	735	147	1189	170
Midday - 1pm	154	151	168	155	187	343	204	815	163	1362	195
1pm - 2pm	149	161	164	158	208	259	216	840	168	1315	188
2pm - 3pm	141	174	184	174	187	261	201	860	172	1322	189
3pm - 4pm	290	298	253	321	264	248	170	1426	285	1844	263
4pm - 5pm	224	273	226	259	238	195	174	1220	244	1589	227
5pm - 6pm	306	222	219	303	274	259	210	1324	265	1793	256
6pm - 7pm	269	258	249	293	285	247	201	1354	271	1802	257
7pm - 8pm	197	237	216	253	196	180	113	1099	220	1392	199
8pm - 9pm	129	172	144	174	115	91	105	734	147	930	133
9pm - 10pm	107	139	126	126	104	85	76	602	120	763	109
10pm - 11pm	54	89	90	100	91	88	66	424	85	578	83
11pm - Midnight	50	61	55	69	82	98	44	317	63	459	66
Total	3270	3544	3398	3728	3514	3577	2669	17454	3490	23700	3385

Source: CFE Information Technologies 2010

Figure A1.2: Traffic volumes (southbound) - Park Parade Bondi (23/7/10 – 30/7/10)

Figure A-12: Name Volumes (Southbound) - Park Parade Bondi (26/7/10 - 30/7/10)

Count Number	6145	Ref : GTK	Lat/Long : S33 53 42.0 / E151 15 33.8	UBD 26 A-9							
Street	PARK PARADE, BONDI : From BONDI ROAD to BIRRELL STREET : SOUTH BOUND										
Location	Midblock House No. 19 ELP SY22651			Carriageway							
TOTAL COUNT MATRIX		Start Date	23-JUL-10	Weekly 50th Percentile Speed	48						
		Start Time	1400	Weekly 85th Percentile Speed	58						
		Duration	7 DAYS	Five Day AADT	2206						
		Interval	1 HOUR	Seven Day AADT	2171						
	MON 26TH	TUE 27TH	WED 28TH	THU 29TH	FRI 23RD / 30TH	SAT 24TH	SUN 25TH	5 Day		7 Day	
								Total	Average	Total	Average
Midnight - 1am	19	16	27	23	25	59	59	110	22	228	33
1am - 2am	5	6	8	6	15	27	39	40	8	106	15
2am - 3am	5	5	4	8	8	19	37	30	6	86	12
3am - 4am	6	4	4	3	2	20	19	19	4	58	8
4am - 5am	9	11	6	6	7	20	16	39	8	75	11
5am - 6am	13	19	17	17	19	14	15	85	17	114	16
6am - 7am	54	41	55	57	63	24	14	270	54	308	44
7am - 8am	60	67	68	82	77	49	27	354	71	430	61
8am - 9am	131	144	103	110	122	70	42	610	122	722	103
9am - 10am	93	111	96	114	95	116	74	509	102	699	100
10am - 11am	95	100	90	104	79	157	100	468	94	725	104
11am - Midday	74	90	104	111	111	170	117	490	98	777	111
Midday - 1pm	99	94	104	102	118	221	139	517	103	877	125
1pm - 2pm	99	108	103	123	155	174	128	588	118	890	127
2pm - 3pm	88	114	115	119	116	179	123	552	110	854	122
3pm - 4pm	212	193	173	224	192	169	109	994	199	1272	182
4pm - 5pm	161	196	165	196	161	130	123	879	176	1132	162
5pm - 6pm	243	165	158	237	214	176	156	1017	203	1349	193
6pm - 7pm	210	189	191	231	212	182	159	1033	207	1374	196
7pm - 8pm	153	175	164	179	137	116	85	808	162	1009	144
8pm - 9pm	99	127	111	127	82	62	80	546	109	688	98
9pm - 10pm	79	110	94	99	80	64	54	462	92	580	83
10pm - 11pm	47	67	71	83	70	67	50	338	68	455	65
11pm - Midnight	43	53	48	57	70	82	36	271	54	389	56
Total	2097	2205	2079	2418	2230	2367	1801	11029	2205	15197	2171

Source: CFE Information Technologies 2010

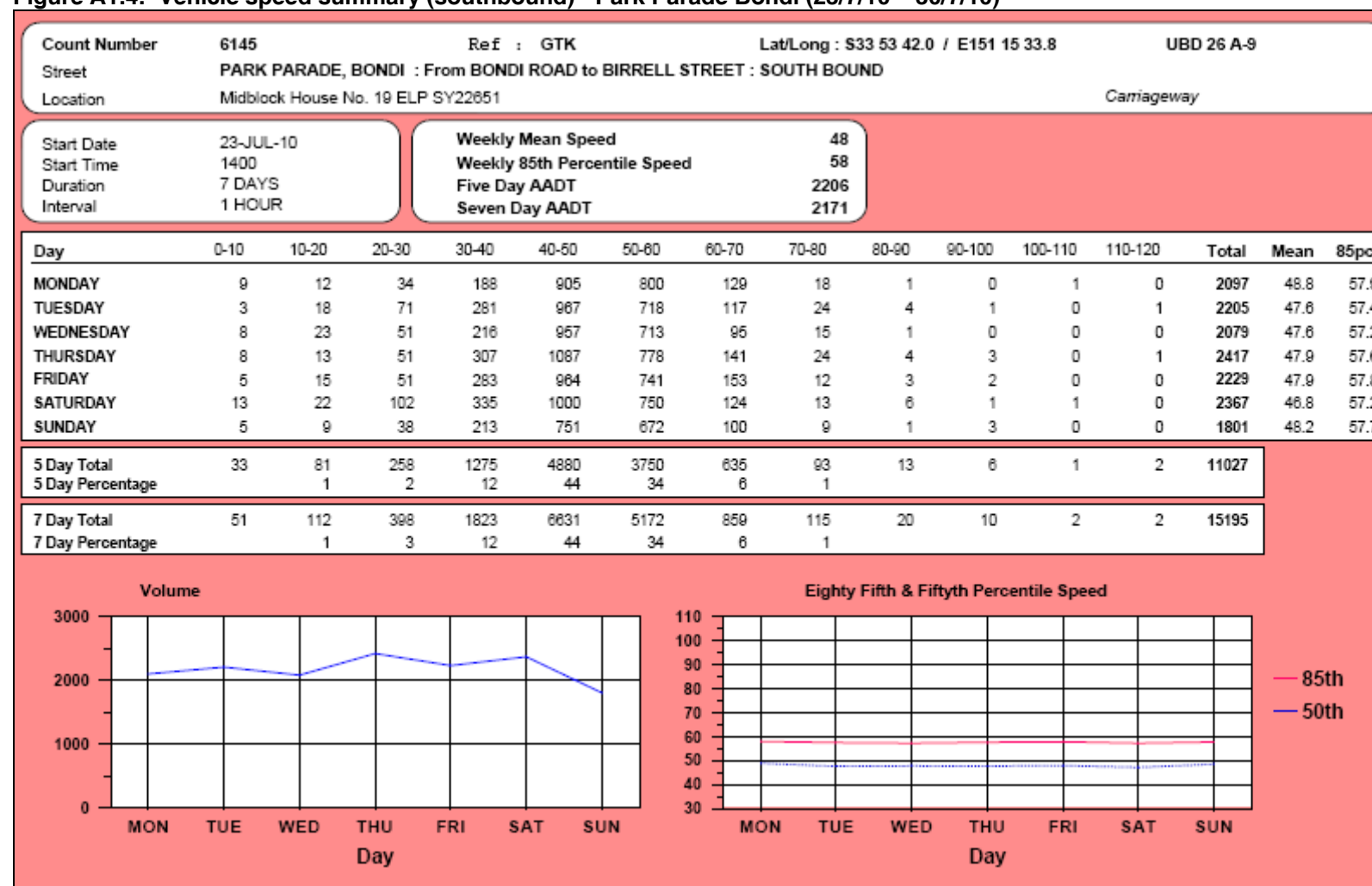
Figure A1.3: Traffic volumes (northbound) - Park Parade Bondi (23/7/10 – 30/7/10)

Figure A.6: Traffic Volumes (Northbound) - Park Parade Bondi (20/7/10 - 26/7/10)

Count Number	6145	Ref :	GTK	Lat/Long :	S33 53 42.0 / E151 15 33.8	UBD 26 A-9					
Street	PARK PARADE, BONDI : From BIRRELL STREET to BONDI ROAD : NORTH BOUND										
Location	Midblock House No. 19 ELP SY22651				Carriageway						
TOTAL COUNT MATRIX		Start Date	23-JUL-10	Weekly 50th Percentile Speed	51						
		Start Time	1400	Weekly 85th Percentile Speed	59						
		Duration	7 DAYS	Five Day AADT	1285						
		Interval	1 HOUR	Seven Day AADT	1215						
	MON 26TH	TUE 27TH	WED 28TH	THU 29TH	FRI 23RD / 30TH	SAT 24TH	SUN 25TH	5 Day Total Average		7 Day Total Average	
Midnight - 1am	8	2	5	5	8	15	17	28	6	60	9
1am - 2am	1	0	1	3	4	8	14	9	2	31	4
2am - 3am	2	3	2	2	0	4	7	9	2	20	3
3am - 4am	5	3	5	4	5	10	6	22	4	38	5
4am - 5am	4	5	9	8	10	8	6	36	7	50	7
5am - 6am	30	24	25	29	29	13	9	137	27	159	23
6am - 7am	64	77	72	62	61	22	12	336	67	370	53
7am - 8am	153	147	162	172	143	44	25	777	155	846	121
8am - 9am	165	197	185	178	148	68	38	873	175	979	140
9am - 10am	98	116	145	125	118	77	61	602	120	740	106
10am - 11am	59	69	67	67	79	108	69	341	68	518	74
11am - Midday	47	52	44	47	55	101	66	245	49	412	59
Midday - 1pm	55	57	64	53	69	122	65	298	60	485	69
1pm - 2pm	50	53	61	35	53	85	88	252	50	425	61
2pm - 3pm	53	60	69	55	71	82	78	308	62	468	67
3pm - 4pm	78	105	80	97	72	79	61	432	86	572	82
4pm - 5pm	63	77	61	63	77	65	51	341	68	457	65
5pm - 6pm	63	57	61	66	60	83	54	307	61	444	63
6pm - 7pm	59	69	58	62	73	65	42	321	64	428	61
7pm - 8pm	44	62	52	74	59	64	28	291	58	383	55
8pm - 9pm	30	45	33	47	33	29	25	188	38	242	35
9pm - 10pm	28	29	32	27	24	21	22	140	28	183	26
10pm - 11pm	7	22	19	17	21	21	16	86	17	123	18
11pm - Midnight	7	8	7	12	12	16	8	46	9	70	10
Total	1173	1339	1319	1310	1284	1210	868	6425	1285	8503	1214

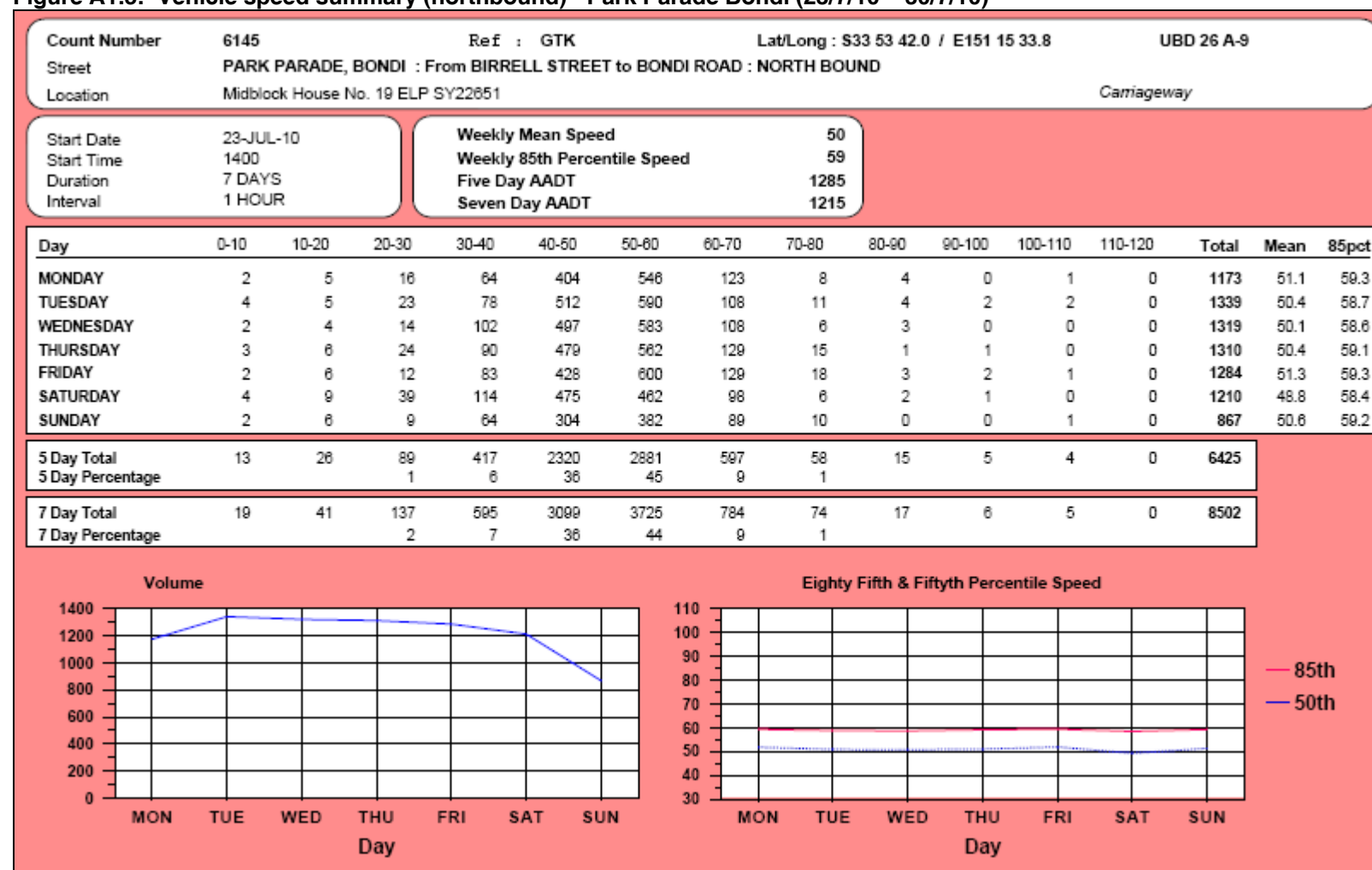
Source: CFE Information Technologies 2010

Figure A1.4: Vehicle speed summary (southbound) - Park Parade Bondi (23/7/10 – 30/7/10)



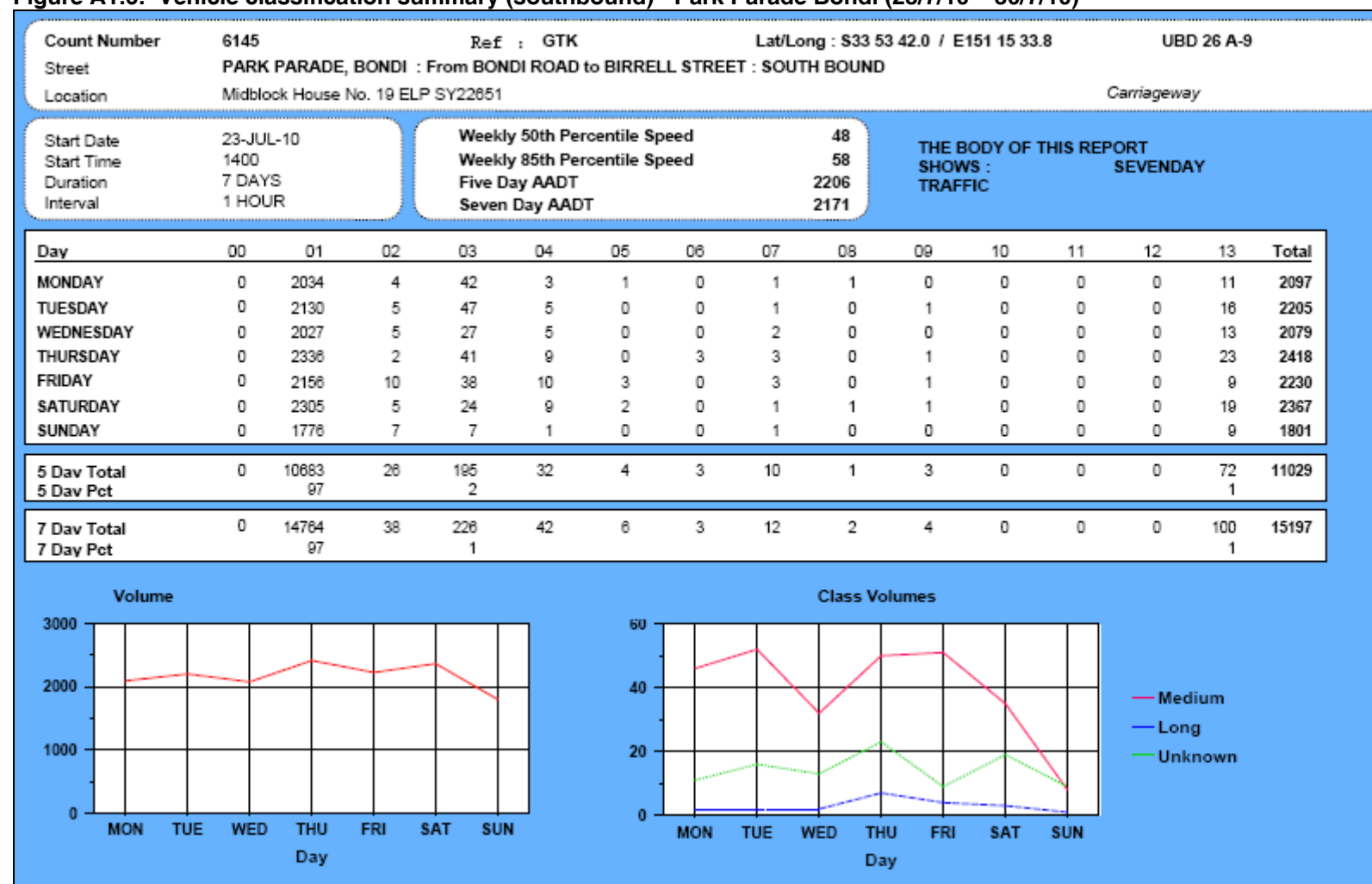
Source: CFE Information Technologies 2010

Figure A1.5: Vehicle speed summary (northbound) - Park Parade Bondi (23/7/10 – 30/7/10)



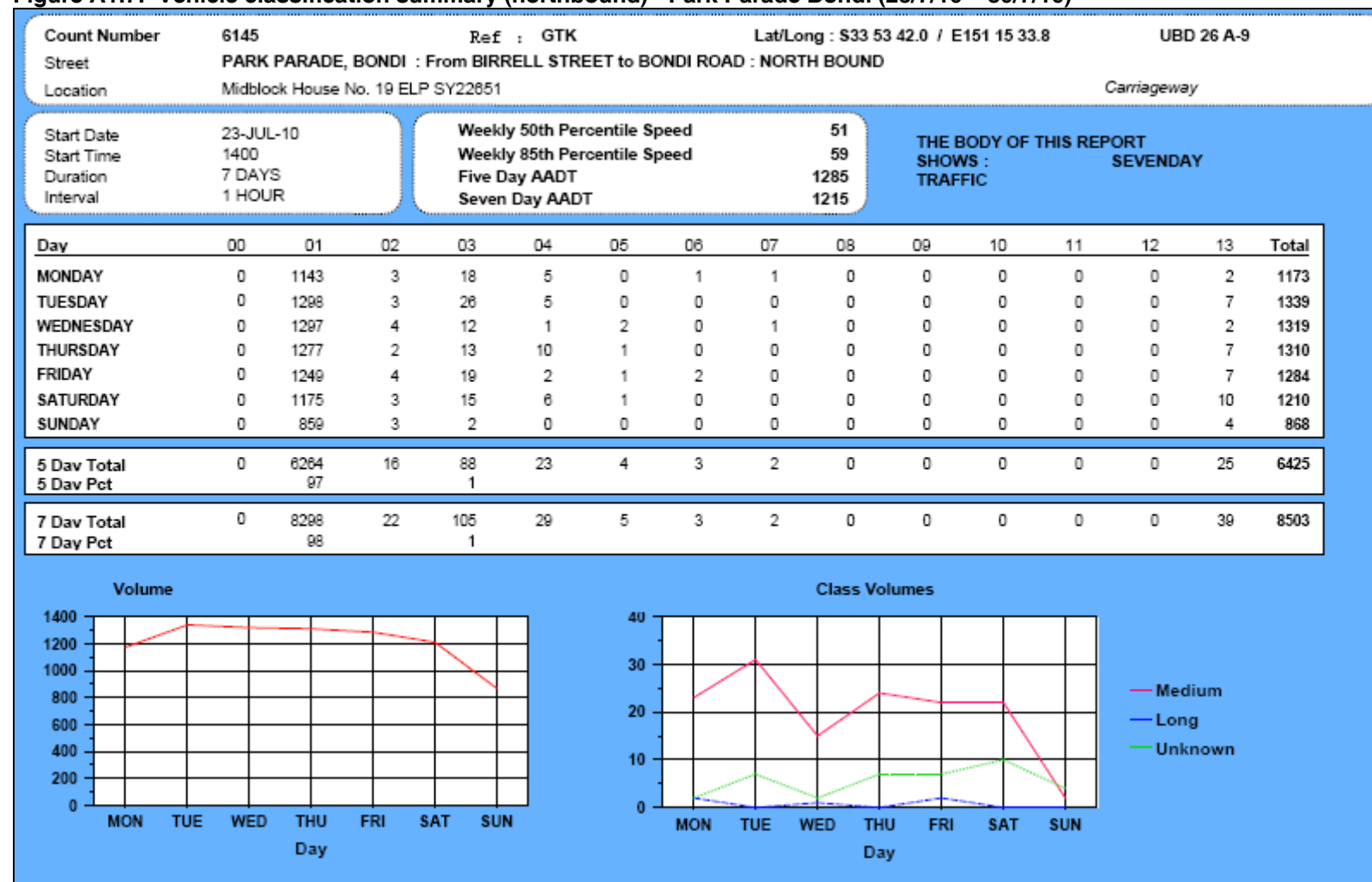
Source: CFE Information Technologies 2010

Figure A1.6: Vehicle classification summary (southbound) - Park Parade Bondi (23/7/10 – 30/7/10)



Source: CFE Information Technologies 2010

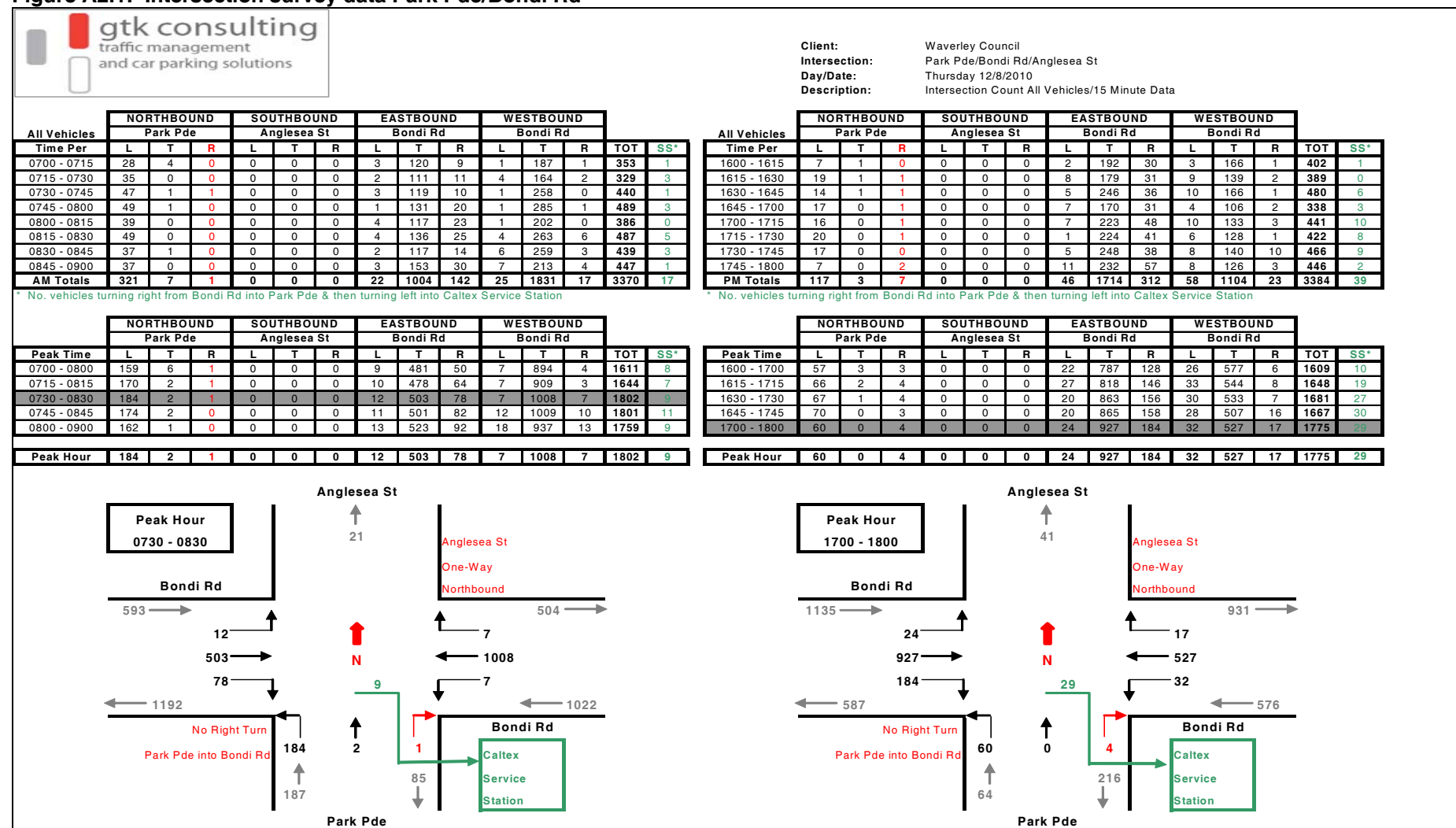
Figure A1.7: Vehicle classification summary (northbound) - Park Parade Bondi (23/7/10 – 30/7/10)



Source: CFE Information Technologies 2010

APPENDIX 2 INTERSECTION SURVEY DATA

Figure A2.1: Intersection survey data Park Pde/Bondi Rd



Source: gtk consulting 2010

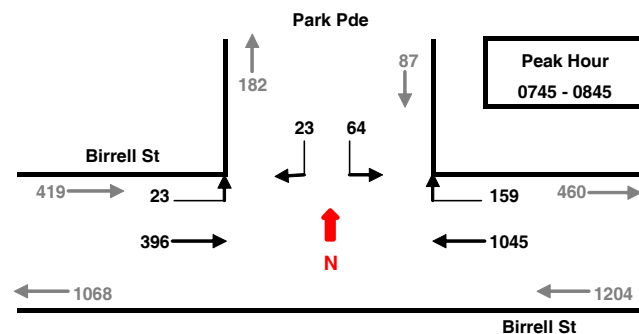
Figure A2.2: Intersection survey data Park Pde/Birrell St



Client: Waverley Council
 Intersection: Park Pde/Birrell St
 Day/Date: Thursday 5/8/2010
 Description: Intersection Count All Vehicles/15 Minute Data

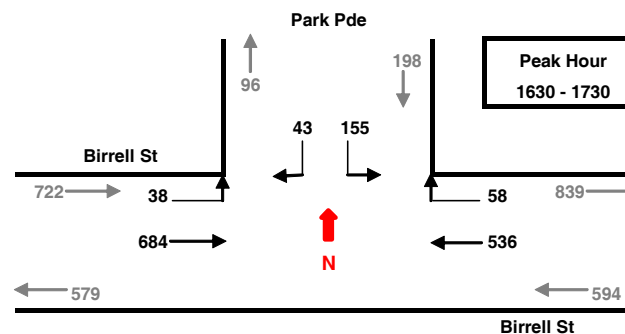
All Vehicles	EAST BOUND		WEST BOUND		SOUTH BOUND		TOT
	Birrell St	Park Pde	Birrell St	Park Pde	Birrell St	Park Pde	
Time Per	L	T	T	R	L	R	
0700 - 0715	4	57	108	23	11	5	208
0715 - 0730	2	62	150	40	10	7	271
0730 - 0745	4	77	228	35	20	8	372
0745 - 0800	4	97	294	39	14	4	452
0800 - 0815	8	109	290	31	15	5	458
0815 - 0830	3	80	243	49	18	6	399
0830 - 0845	8	110	218	40	17	8	401
0845 - 0900	6	125	184	31	17	8	371
AM Totals	39	717	1715	288	122	51	2932

Peak Time	EAST BOUND		WEST BOUND		SOUTH BOUND		TOT
	Birrell St	Park Pde	Birrell St	Park Pde	Birrell St	Park Pde	
Peak Time	L	T	T	R	L	R	
0700 - 0800	14	293	780	137	55	24	1303
0715 - 0815	18	345	962	145	59	24	1553
0730 - 0830	19	363	1055	154	67	23	1681
0745 - 0845	23	396	1045	159	64	23	1710
0800 - 0900	25	424	935	151	67	27	1629
Peak Hour	23	396	1045	159	64	23	1710



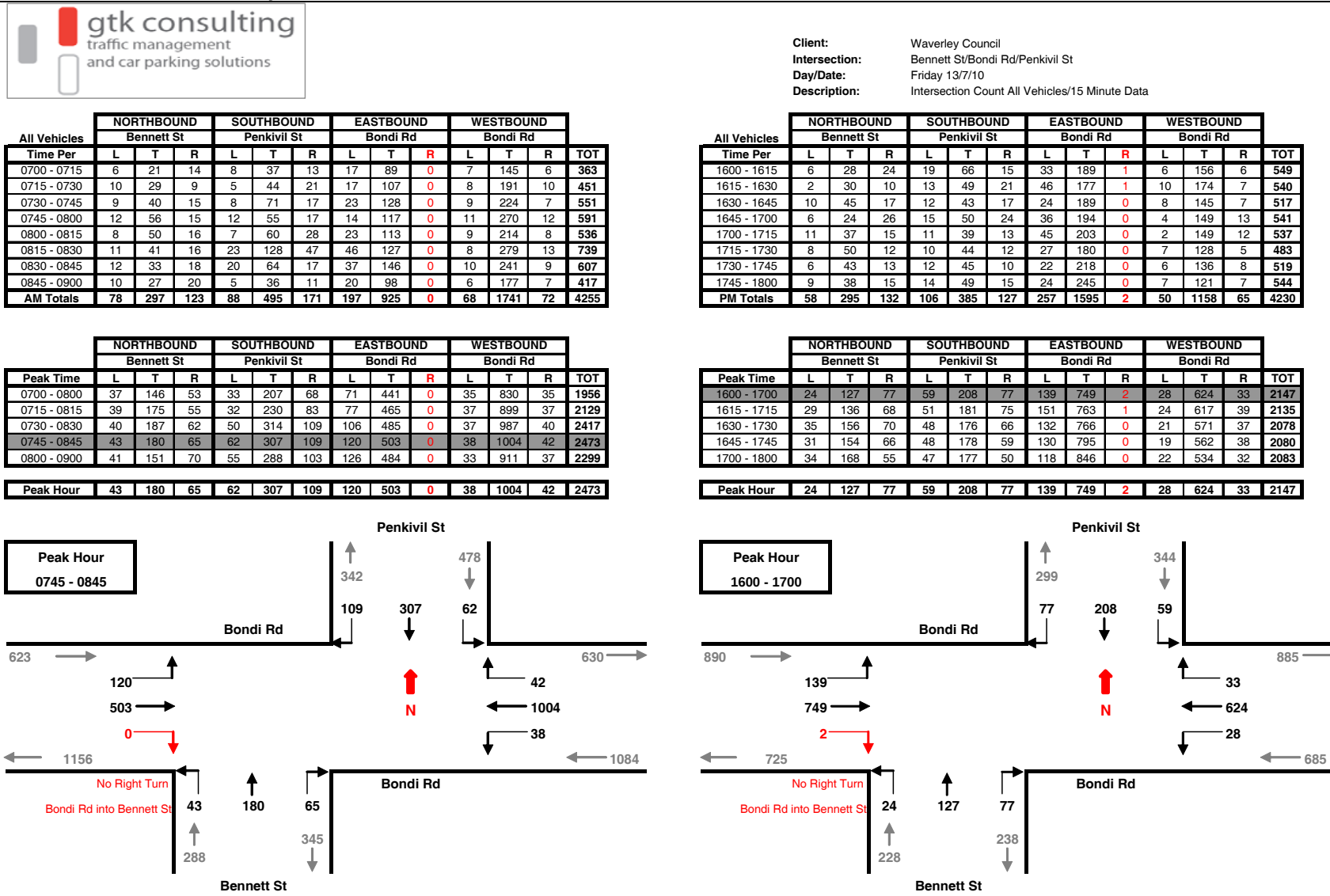
All Vehicles	EAST BOUND		WEST BOUND		SOUTH BOUND		TOT
	Birrell St	Park Pde	Birrell St	Park Pde	Birrell St	Park Pde	
Time Per	L	T	T	R	L	R	
1600 - 1615	5	124	129	12	25	13	308
1615 - 1630	9	148	137	19	30	19	362
1630 - 1645	13	164	140	19	30	16	382
1645 - 1700	7	157	111	18	45	9	347
1700 - 1715	11	184	141	12	42	8	398
1715 - 1730	7	179	144	9	38	10	387
1730 - 1745	5	167	132	15	42	10	371
1745 - 1800	5	150	119	11	40	8	333
PM Totals	62	1273	1053	115	292	93	2888

Peak Time	EAST BOUND		WEST BOUND		SOUTH BOUND		TOT
	Birrell St	Park Pde	Birrell St	Park Pde	Birrell St	Park Pde	
Peak Time	L	T	T	R	L	R	
1600 - 1700	34	593	517	68	130	57	1399
1615 - 1715	40	653	529	68	147	52	1489
1630 - 1730	38	684	536	58	155	43	1514
1645 - 1745	30	687	528	54	167	37	1503
1700 - 1800	28	680	536	47	162	36	1489
Peak Hour	38	684	536	58	155	43	1514



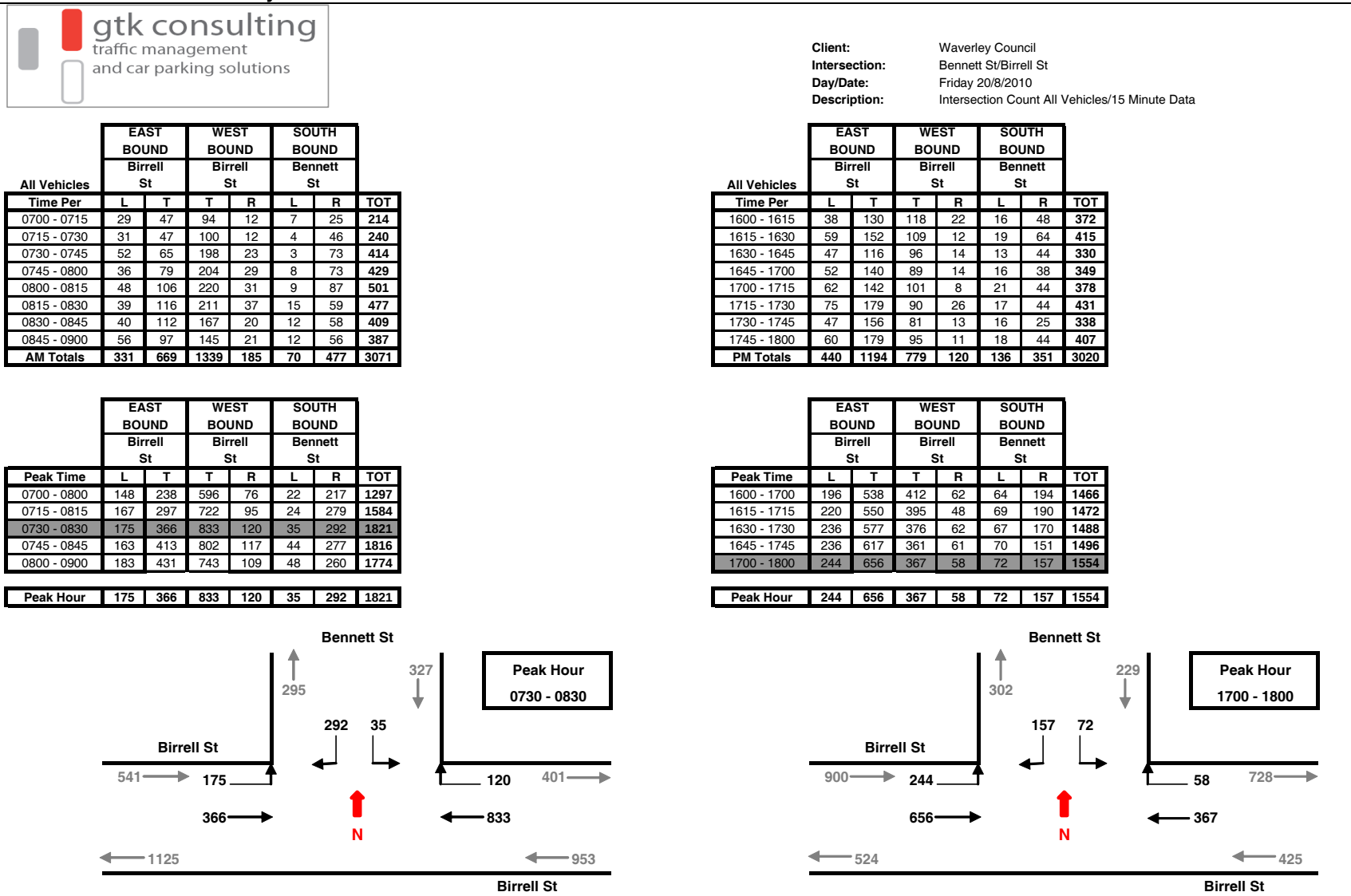
Source: gk consulting 2010

Figure A2.3: Intersection survey data Bennett St/Bondi Rd



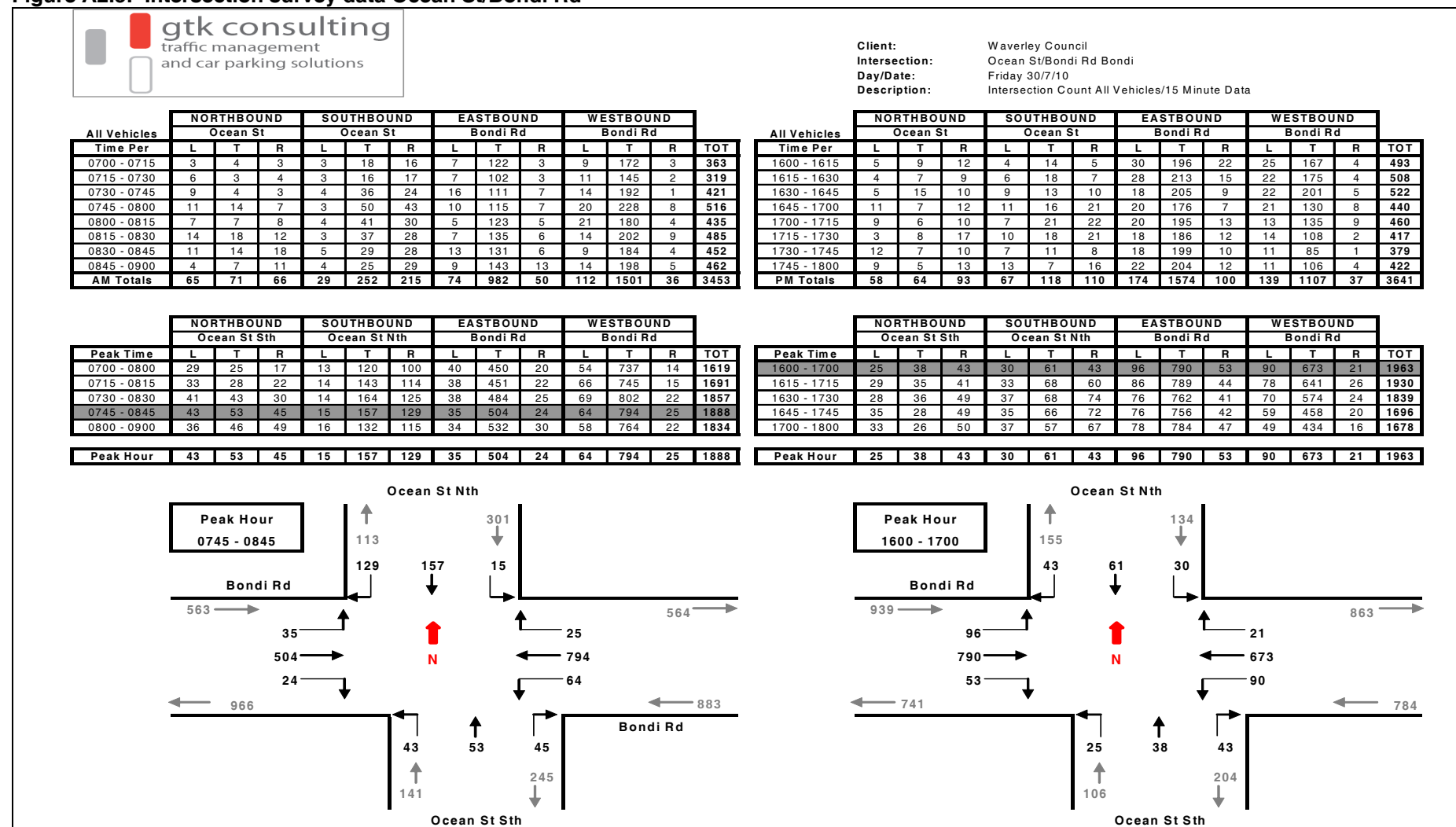
Source: gtk consulting 2010

Figure A2.4: Intersection survey data Bennett St/Birrell St



Source: gtk consulting 2010

Figure A2.5: Intersection survey data Ocean St/Bondi Rd



Source: gtk consulting 2010

Figure A2.6: Intersection survey data Ocean St/Birrell St



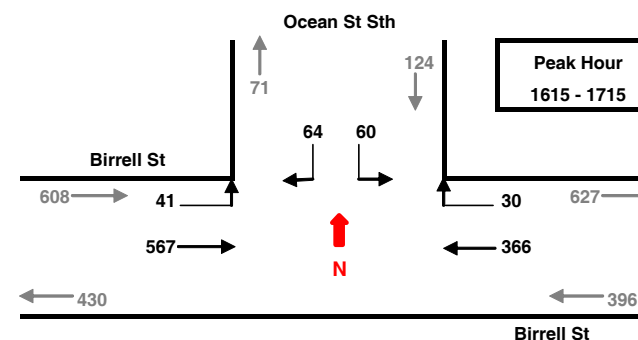
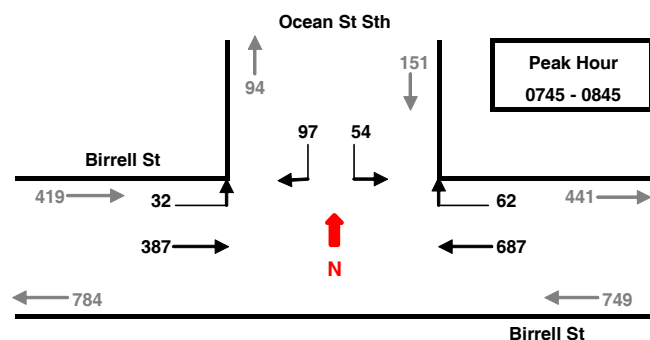
Client: Waverley Council
 Intersection: Ocean St/Birrell St
 Day/Date: Friday 6/8/2010
 Description: Intersection Count All Vehicles/15 Minute Data

All Vehicles	EAST BOUND Birrell St		WEST BOUND Birrell St		SOUTH BOUND Ocean St Sth		TOT
	L	T	T	R	L	R	
Time Per							
0700 - 0715	4	43	64	4	8	12	135
0715 - 0730	3	47	75	10	11	10	156
0730 - 0745	6	52	157	5	13	25	258
0745 - 0800	4	92	186	15	17	28	342
0800 - 0815	16	84	199	17	12	20	348
0815 - 0830	3	87	159	17	18	31	315
0830 - 0845	9	124	143	13	7	18	314
0845 - 0900	15	115	134	9	13	14	300
AM Totals	60	644	1117	90	99	158	2168

All Vehicles	EAST BOUND Birrell St		WEST BOUND Birrell St		SOUTH BOUND Ocean St Sth		TOT
	L	T	T	R	L	R	
Time Per							
1600 - 1615	16	128	111	12	6	24	297
1615 - 1630	17	120	94	10	14	15	270
1630 - 1645	7	133	87	7	21	12	267
1645 - 1700	5	119	85	3	11	16	239
1700 - 1715	12	195	100	10	14	21	352
1715 - 1730	6	104	58	6	11	9	194
1730 - 1745	10	157	84	7	19	12	289
1745 - 1800	7	136	64	9	24	7	247
PM Totals	80	1092	683	64	120	116	2155

Peak Time	EAST BOUND Birrell St		WEST BOUND Birrell St		SOUTH BOUND Ocean St Sth		TOT
	L	T	T	R	L	R	
0700 - 0800	17	234	482	34	49	75	891
0715 - 0815	29	275	617	47	53	83	1104
0730 - 0830	29	315	701	54	60	104	1263
0745 - 0845	32	387	687	62	54	97	1319
0800 - 0900	43	410	635	56	50	83	1277
Peak Hour	32	387	687	62	54	97	1319

Peak Time	EAST BOUND Birrell St		WEST BOUND Birrell St		SOUTH BOUND Ocean St Sth		TOT
	L	T	T	R	L	R	
1600 - 1700	45	500	377	32	52	67	1073
1615 - 1715	41	567	366	30	60	64	1128
1630 - 1730	30	551	330	26	57	58	1052
1645 - 1745	33	575	327	26	55	58	1074
1700 - 1800	35	592	306	32	68	49	1082
Peak Hour	41	567	366	30	60	64	1128



Source: gk consulting 2010

APPENDIX 3 SIDRA RESULTS EXISTING ROAD NETWORK

Figure A3.1: SIDRA modelling intersection Bondi Rd/Park Pde - existing AM peak



Movement Summary

Bondi Road and Park Parade

2010 Existing AM Peak (7:30 - 8:30am)

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Park Parade (South)										
1	L	184	0.0	0.584	23.4	LOS B	25	0.87	1.12	32.0
2	T	2	0.0	0.667	22.1	LOS B	25	0.87	1.09	32.6
Approach		186	0.0	0.583	23.4	LOS B	25	0.87	1.12	32.0
Bondi Road (East)										
4	L	7	0.0	0.259	6.4	LOS A	0	0.00	0.61	43.3
5	T	1008	0.0	0.264	1.3	LOS A	22	0.31	0.00	47.2
6	R	7	0.0	0.259	9.3	LOS A	22	0.63	0.78	40.8
Approach		1022	0.0	0.264	1.4	LOS A	22	0.31	0.01	47.2
Bondi Road (West)										
10	L	12	0.0	0.197	6.4	LOS A	0	0.00	0.61	43.3
11	T	503	0.0	0.196	1.8	LOS A	14	0.21	0.00	47.9
12	R	78	0.0	0.196	13.3	LOS A	14	0.80	0.94	37.8
Approach		593	0.0	0.196	3.4	LOS A	14	0.28	0.14	46.2
All Vehicles		1801	0.0	0.667	4.3	Not Applicable	25	0.36	0.17	44.7

Source: gtk consulting 2010

Figure A3.2: SIDRA modelling intersection Bondi Rd/Park Pde - existing PM peak



Movement Summary

Bondi Road and Park Parade

2010 Existing PM Peak (17:00 - 18:00pm)

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Park Parade (South)										
1	L	60	0.0	0.124	11.5	LOS A	4	0.56	0.79	39.1
2	T	1	0.0	0.125	10.2	LOS A	4	0.56	0.79	40.1
3	R	3	0.0	0.125	11.7	LOS A	4	0.56	0.84	39.0
Approach		64	0.0	0.124	11.5	LOS A	4	0.56	0.79	39.2
Bondi Road (East)										
4	L	32	0.0	0.052	6.4	LOS A	0	0.00	0.61	43.3
5	T	527	0.0	0.261	6.1	LOS A	33	0.74	0.00	43.6
6	R	17	0.0	0.262	13.6	LOS A	33	0.86	0.99	37.6
Approach		576	0.0	0.261	6.3	LOS A	33	0.71	0.06	43.4
Bondi Road (West)										
10	L	24	0.0	0.333	6.4	LOS A	0	0.00	0.61	43.3
11	T	927	0.0	0.331	1.1	LOS A	26	0.21	0.00	48.1
12	R	184	0.0	0.331	9.9	LOS A	26	0.65	0.86	40.3
Approach		1135	0.0	0.331	2.7	LOS A	26	0.28	0.15	46.5
All Vehicles		1775	0.0	0.333	4.2	Not Applicable	33	0.43	0.15	45.1

Source: gtk consulting 2010

Figure A3.3: SIDRA modelling intersection Park Pde/Birrell St - existing AM peak

 Movement Summary Park Parade and Birrell Street 2010 Existing AM Peak (7:45 - 8:45am) Give-way Vehicle Movements										
Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	1045	0.0	0.333	0.9	LOS A	25	0.22	0.00	48.0
6	R	159	0.0	0.333	8.8	LOS A	25	0.59	0.75	41.2
Approach		1204	0.0	0.333	1.9	LOS A	25	0.27	0.10	47.0
Park Parade (North)										
7	L	64	0.0	0.245	15.7	LOS B	8	0.62	0.81	36.2
9	R	23	0.0	0.245	15.9	LOS B	8	0.62	0.87	36.1
Approach		87	0.0	0.245	15.8	LOS B	8	0.62	0.83	36.2
Birrell Street (West)										
10	L	23	0.0	0.108	6.4	LOS A	0	0.00	0.61	43.3
11	T	396	0.0	0.108	0.0	LOS A	0	0.00	0.00	50.0
Approach		419	0.0	0.108	0.4	LOS A		0.00	0.03	49.6
All Vehicles		1710	0.0	0.333	2.2	Not Applicable	25	0.22	0.12	46.9

Source: gtk consulting 2010

Figure A3.4: SIDRA modelling intersection Park Pde/Birrell St - existing PM peak



Movement Summary

Park Parade and Birrell Street

2010 Existing PM Peak (16:30 - 17:30pm)

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	536	0.0	0.341	5.2	LOS A	39	0.78	0.00	43.6
6	R	58	0.0	0.341	11.7	LOS A	39	0.78	0.99	39.0
Approach		594	0.0	0.341	5.8	LOS A	39	0.78	0.10	43.1
Park Parade (North)										
7	L	155	0.0	0.477	17.4	LOS B	21	0.76	1.04	35.2
9	R	43	0.0	0.478	17.6	LOS B	21	0.76	1.02	35.1
Approach		198	0.0	0.478	17.5	LOS B	21	0.76	1.03	35.2
Birrell Street (West)										
10	L	38	0.0	0.185	6.4	LOS A	0	0.00	0.61	43.3
11	T	684	0.0	0.186	0.0	LOS A	0	0.00	0.00	50.0
Approach		722	0.0	0.186	0.3	LOS A		0.00	0.03	49.6
All Vehicles		1514	0.0	0.478	4.7	Not Applicable	39	0.40	0.19	44.6

Source: gtk consulting 2010

Figure A3.5: SIDRA modelling intersection Bondi Rd/Bennett St - existing AM peak



Movement Summary

Bondi Road and Bennett Street

2010 Existing AM Peak (7:45 - 8:45)

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bennett St (South)										
1	L	43	0.0	0.253	53.7	LOS D	22	0.90	0.73	21.8
2	T	180	0.0	0.804	57.7	LOS E	113	1.00	0.95	20.9
3	R	65	0.0	0.803	64.1	LOS E	113	1.00	0.95	19.6
Approach		288	0.0	0.804	58.5	LOS E	113	0.98	0.91	20.7
Bondi Road (East)										
4	L	38	0.0	0.786	23.6	LOS B	174	0.72	0.82	31.9
5	T	1004	0.0	0.783	21.3	LOS B	174	0.77	0.70	33.0
6	R	42	0.0	0.782	33.5	LOS C	154	0.84	0.86	27.7
Approach		1084	0.0	0.783	21.8	LOS B	174	0.77	0.71	32.7
Penkivil Street (North)										
7	L	62	0.0	0.331	45.6	LOS D	28	0.83	0.74	23.8
8	T	307	0.0	0.786	46.0	LOS D	167	0.99	0.91	23.7
9	R	109	0.0	0.786	52.4	LOS D	167	0.99	0.92	22.1
Approach		478	0.0	0.786	47.4	LOS D	167	0.97	0.89	23.3
Bondi Road (West)										
10	L	120	0.0	0.172	33.1	LOS C	43	0.71	0.75	27.8
11	T	503	0.0	0.619	29.4	LOS C	163	0.84	0.75	29.2
Approach		623	0.0	0.619	30.1	LOS C	163	0.82	0.75	28.9
All Vehicles		2473	0.0	0.804	33.1	LOS C	174	0.85	0.78	27.8

Source: gtk consulting 2010

Figure A3.6: SIDRA modelling intersection Bondi Rd/Bennett St - existing PM peak



Movement Summary

Bondi Road and Bennett Street

2010 Existing PM Peak (16:00 - 17:00pm)

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bennett St (South)										
1	L	24	0.0	0.147	57.3	LOS E	13	0.92	0.71	21.0
2	T	127	0.0	0.853	64.1	LOS E	101	1.00	1.01	19.6
3	R	77	0.0	0.853	70.5	LOS F	101	1.00	1.01	18.5
Approach		228	0.0	0.853	65.5	LOS E	101	0.99	0.98	19.3
Bondi Road (East)										
4	L	28	0.0	0.176	18.1	LOS B	13	0.34	0.67	34.8
5	T	624	0.0	0.882	25.5	LOS B	226	0.85	0.84	30.9
6	R	33	0.0	0.881	32.8	LOS C	226	0.88	0.95	27.9
Approach		685	0.0	0.882	25.6	LOS B	226	0.83	0.84	30.9
Penkivil Street (North)										
7	L	59	0.0	0.894	57.0	LOS E	30	0.87	0.82	21.1
8	T	208	0.0	0.523	39.0	LOS C	107	0.90	0.76	25.7
9	R	77	0.0	0.523	45.4	LOS D	107	0.90	0.83	23.9
Approach		344	0.0	0.894	43.5	LOS D	107	0.89	0.79	24.4
Bondi Road (West)										
10	L	139	0.0	0.532	33.7	LOS C	135	0.80	0.82	27.6
11	T	749	0.0	0.532	26.5	LOS B	141	0.79	0.69	30.4
Approach		888	0.0	0.532	27.7	LOS B	141	0.79	0.72	29.9
All Vehicles		2145	0.0	0.894	33.6	LOS C	226	0.84	0.79	27.6

Source: gtk consulting 2010

Figure A3.7: SIDRA modelling intersection Birrell St/ Bennett St - existing AM peak



Movement Summary

Birrell Street and Bennett Street

2010 Existing AM Peak (7:30 - 8:30am)

Signalised - Fixed time

Cycle Time = 60 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	833	0.0	0.625	9.5	LOS A	82	0.74	0.63	40.5
6	R	120	0.0	0.625	16.6	LOS B	63	0.86	0.82	35.7
Approach		953	0.0	0.625	10.4	LOS A	82	0.75	0.65	39.8
Bennett Street (North)										
7	L	35	0.0	0.083	17.6	LOS B	7	0.62	0.69	35.1
9	R	292	0.0	0.629	29.1	LOS C	68	0.94	0.84	29.4
Approach		327	0.0	0.629	27.8	LOS B	68	0.91	0.82	29.9
Birrell Street (West)										
10	L	175	0.0	0.435	29.2	LOS C	43	0.91	0.79	29.3
11	T	366	0.0	0.626	20.1	LOS B	78	0.92	0.78	33.7
Approach		541	0.0	0.626	23.0	LOS B	78	0.91	0.78	32.1
All Vehicles		1821	0.0	0.629	17.3	LOS B	82	0.83	0.72	35.2

Source: gtk consulting 2010

Figure A3.8: SIDRA modelling intersection Birrell St/ Bennett St - existing PM peak



Movement Summary

Birrell Street and Bennett Street

2010 Existing PM Peak (17:00 - 18:00pm)

Signalised - Fixed time

Cycle Time = 90 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	367	0.0	0.280	5.6	LOS A	35	0.44	0.37	44.0
6	R	58	0.0	0.280	14.3	LOS A	25	0.63	0.74	37.2
Approach		425	0.0	0.280	6.8	LOS A	35	0.46	0.42	42.9
Bennett Street (North)										
7	L	72	0.0	0.301	36.3	LOS C	25	0.83	0.74	26.6
9	R	157	0.0	0.544	45.5	LOS D	58	0.97	0.80	23.8
Approach		229	0.0	0.543	42.7	LOS D	58	0.93	0.78	24.6
Birrell Street (West)										
10	L	244	0.0	0.252	19.0	LOS B	52	0.59	0.75	34.3
11	T	656	0.0	0.582	12.9	LOS A	133	0.69	0.62	38.1
Approach		900	0.0	0.582	14.6	LOS B	133	0.66	0.65	37.0
All Vehicles		1554	0.0	0.582	16.6	LOS B	133	0.65	0.61	35.7

Source: gtk consulting 2010

Figure A3.9: SIDRA modelling intersection Bondi Rd/ Ocean St - existing AM peak



Movement Summary

Bondi Road and Ocean Street

2010 Existing AM Peak (7:45 - 8:45am)

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Ocean Street (South)										
1	L	43	0.0	0.556	65.0	LOS E	51	1.00	0.78	19.5
2	T	53	0.0	0.556	58.6	LOS E	51	1.00	0.78	20.7
3	R	45	0.0	0.316	59.3	LOS E	25	0.94	0.74	20.6
Approach		141	0.0	0.556	60.8	LOS E	51	0.98	0.77	20.3
Bondi Road (East)										
4	L	64	0.0	0.546	17.3	LOS B	90	0.43	0.73	35.3
5	T	794	0.0	0.546	12.7	LOS A	91	0.48	0.42	38.2
6	R	25	0.0	0.545	21.2	LOS B	91	0.53	0.75	33.1
Approach		883	0.0	0.546	13.3	LOS A	91	0.48	0.45	37.8
Ocean Street (North)										
7	L	15	0.0	0.340	44.6	LOS D	69	0.85	0.79	24.1
8	T	157	0.0	0.340	38.2	LOS C	69	0.85	0.70	26.0
9	R	129	0.0	0.748	49.7	LOS D	58	0.83	0.87	22.7
Approach		301	0.0	0.748	43.5	LOS D	69	0.84	0.78	24.4
Bondi Road (West)										
10	L	35	0.0	0.273	17.2	LOS B	7	0.31	0.65	35.3
11	T	504	0.0	0.732	14.0	LOS A	130	0.62	0.55	37.3
12	R	24	0.0	0.731	20.4	LOS B	130	0.62	0.79	33.5
Approach		563	0.0	0.732	14.5	LOS A	130	0.60	0.57	37.0
All Vehicles		1888	0.0	0.748	22.0	LOS B	130	0.61	0.56	32.6

Source: gtk consulting 2010

Figure A3.10: SIDRA modelling intersection Bondi Rd/ Ocean St - existing PM peak



Movement Summary

Bondi Road and Ocean Street

2010 Existing PM Peak (16:00 - 17:00pm)

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Ocean Street (South)										
1	L	25	0.0	0.355	62.7	LOS E	34	0.97	0.76	19.9
2	T	38	0.0	0.355	56.3	LOS D	34	0.97	0.74	21.1
3	R	43	0.0	0.302	59.2	LOS E	24	0.94	0.73	20.6
Approach		106	0.0	0.355	59.0	LOS E	34	0.96	0.74	20.6
Bondi Road (East)										
4	L	90	0.0	0.162	9.4	LOS A	3	0.12	0.63	40.8
5	T	673	0.0	0.697	2.1	LOS A	53	0.16	0.15	47.5
6	R	21	0.0	0.702	8.6	LOS A	53	0.16	0.66	41.4
Approach		784	0.0	0.698	3.1	LOS A	53	0.16	0.22	46.5
Ocean Street (North)										
7	L	30	0.0	0.494	63.6	LOS E	48	0.99	0.78	19.7
8	T	61	0.0	0.494	57.2	LOS E	48	0.99	0.77	21.0
9	R	43	0.0	0.302	59.2	LOS E	24	0.94	0.73	20.6
Approach		134	0.0	0.494	59.3	LOS E	48	0.97	0.76	20.6
Bondi Road (West)										
10	L	96	0.0	0.501	8.2	LOS A	31	0.10	0.64	41.7
11	T	790	0.0	0.501	1.8	LOS A	31	0.10	0.09	47.9
12	R	53	0.0	0.500	8.2	LOS A	20	0.10	0.64	41.7
Approach		939	0.0	0.501	2.8	LOS A	31	0.10	0.18	46.8
All Vehicles		1963	0.0	0.702	9.8	LOS A	53	0.23	0.26	40.4

Source: gtk consulting 2010

Figure A3.11: SIDRA modelling intersection Birrell St/ Ocean St - existing AM peak



Movement Summary

Birrell Street and Ocean Street

2010 Existing AM Peak (7:45 - 8:45am)

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	687	0.0	0.403	2.8	LOS A	41	0.66	0.00	51.9
6	R	62	0.0	0.403	11.1	LOS A	41	0.66	0.82	45.9
Approach		749	0.0	0.403	3.5	LOS A	41	0.66	0.07	51.4
Ocean Street (North)										
7	L	54	0.0	0.397	19.2	LOS B	15	0.71	0.96	39.2
9	R	97	0.0	0.398	19.4	LOS B	15	0.71	0.97	39.1
Approach		151	0.0	0.397	19.3	LOS B	15	0.71	0.97	39.1
Birrell Street (West)										
10	L	32	0.0	0.017	8.2	LOS A	0	0.00	0.67	49.0
11	T	387	0.0	0.198	0.0	LOS A	0	0.00	0.00	60.0
Approach		419	0.0	0.198	0.6	LOS A		0.00	0.05	59.0
All Vehicles		1319	0.0	0.403	4.4	Not Applicable	41	0.46	0.17	51.7

Source: gtk consulting 2010

Figure A3.12: SIDRA modelling intersection Birrell St/Ocean St - existing PM peak



Movement Summary

Birrell Street and Ocean Street

2010 Existing PM Peak (16:15 - 17:15pm)

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	366	0.0	0.218	3.1	LOS A	18	0.64	0.00	52.2
6	R	30	0.0	0.217	11.4	LOS A	18	0.64	0.82	45.6
Approach		396	0.0	0.218	3.7	LOS A	18	0.64	0.06	51.6
Ocean Street (North)										
7	L	60	0.0	0.268	15.4	LOS B	9	0.66	0.92	42.1
9	R	64	0.0	0.268	15.5	LOS B	9	0.66	0.92	42.0
Approach		124	0.0	0.267	15.5	LOS B	9	0.66	0.92	42.1
Birrell Street (West)										
10	L	41	0.0	0.022	8.2	LOS A	0	0.00	0.67	49.0
11	T	567	0.0	0.291	0.0	LOS A	0	0.00	0.00	60.0
Approach		608	0.0	0.291	0.6	LOS A		0.00	0.04	59.1
All Vehicles		1128	0.0	0.291	3.3	Not Applicable	18	0.30	0.15	54.0

Source: gtk consulting 2010

APPENDIX 4 SIDRA RESULTS NORTHBOUND OPTION

Figure A4.1: SIDRA modelling intersection Bondi Rd/ Bennett St – northbound option AM peak



Movement Summary

Bondi Road and Bennett Street

Proposed AM Peak (7:45 - 8:45) - Northbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bennett St (South)										
1	L	43	0.0	0.253	53.7	LOS D	22	0.90	0.73	21.8
2	T	180	0.0	0.804	57.7	LOS E	113	1.00	0.95	20.9
3	R	65	0.0	0.803	64.1	LOS E	113	1.00	0.95	19.6
Approach		288	0.0	0.804	58.5	LOS E	113	0.98	0.91	20.7
Bondi Road (East)										
4	L	45	0.0	0.807	29.3	LOS C	194	0.72	0.86	29.3
5	T	1004	0.0	0.804	26.3	LOS B	194	0.79	0.74	30.6
6	R	42	0.0	0.804	38.3	LOS C	155	0.90	0.89	26.0
Approach		1091	0.0	0.804	26.9	LOS B	194	0.79	0.75	30.3
Penkivil Street (North)										
7	L	62	0.0	0.335	46.5	LOS D	29	0.84	0.74	23.6
8	T	307	0.0	0.811	48.4	LOS D	172	1.00	0.95	23.0
9	R	109	0.0	0.811	54.8	LOS D	172	1.00	0.95	21.5
Approach		478	0.0	0.810	49.6	LOS D	172	0.98	0.92	22.7
Bondi Road (West)										
10	L	120	0.0	0.148	12.4	LOS A	22	0.34	0.68	38.5
11	T	581	0.0	0.701	30.2	LOS C	194	0.88	0.79	28.9
Approach		701	0.0	0.701	27.1	LOS B	194	0.79	0.77	30.2
All Vehicles		2558	0.0	0.811	34.8	LOS C	194	0.85	0.81	27.2

Source: gtk consulting 2010

Figure A4.2: SIDRA modelling intersection Bondi Rd/ Bennett St – northbound option PM peak



Movement Summary

Bondi Road and Bennett Street

Proposed PM Peak (16:00 - 17:00pm) - Northbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bennett St (South)										
1	L	24	0.0	0.149	58.4	LOS E	13	0.93	0.71	20.8
2	T	127	0.0	0.914	72.8	LOS F	108	1.00	1.13	18.1
3	R	77	0.0	0.914	79.2	LOS F	108	1.00	1.13	17.2
Approach		228	0.0	0.914	73.5	LOS F	108	0.99	1.09	18.0
Bondi Road (East)										
4	L	60	0.0	0.182	16.8	LOS B	13	0.31	0.66	35.6
5	T	624	0.0	0.909	28.7	LOS C	251	0.90	0.93	29.5
6	R	33	0.0	0.910	35.5	LOS C	251	0.91	1.00	26.9
Approach		717	0.0	0.909	28.0	LOS B	251	0.85	0.91	29.8
Penkivil Street (North)										
7	L	59	0.0	0.914	57.1	LOS E	30	0.89	0.80	21.0
8	T	208	0.0	0.556	40.9	LOS C	109	0.92	0.78	25.1
9	R	77	0.0	0.555	47.3	LOS D	109	0.92	0.83	23.4
Approach		344	0.0	0.915	45.1	LOS D	109	0.91	0.79	23.9
Bondi Road (West)										
10	L	139	0.0	0.605	33.0	LOS C	163	0.81	0.84	27.9
11	T	933	0.0	0.604	25.8	LOS B	168	0.80	0.72	30.8
Approach		1072	0.0	0.604	26.7	LOS B	168	0.81	0.73	30.4
All Vehicles		2361	0.0	0.914	34.3	LOS C	251	0.85	0.83	27.3

Source: gtk consulting 2010

Figure A4.3: SIDRA modelling intersection Birrell St/ Bennett St – northbound option AM peak



Movement Summary

Birrell Street and Bennett Street

Proposed AM Peak (7:30 - 8:30am) - Northbound Scenario

Signalised - Fixed time

Cycle Time = 60 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	833	0.0	0.625	9.5	LOS A	82	0.74	0.63	40.5
6	R	120	0.0	0.625	16.6	LOS B	63	0.86	0.82	35.7
Approach		953	0.0	0.625	10.4	LOS A	82	0.75	0.65	39.8
Bennett Street (North)										
7	L	35	0.0	0.083	17.6	LOS B	7	0.62	0.69	35.1
9	R	299	0.0	0.644	29.3	LOS C	69	0.95	0.85	29.3
Approach		334	0.0	0.644	28.1	LOS B	69	0.91	0.83	29.8
Birrell Street (West)										
10	L	175	0.0	0.435	29.2	LOS C	43	0.91	0.79	29.3
11	T	366	0.0	0.626	20.1	LOS B	78	0.92	0.78	33.7
Approach		541	0.0	0.626	23.0	LOS B	78	0.91	0.78	32.1
All Vehicles		1828	0.0	0.644	17.4	LOS B	82	0.83	0.72	35.2

Source: gtk consulting 2010

Figure A4.4: SIDRA modelling intersection Birrell St/ Bennett St – northbound option PM peak



Movement Summary

Birrell Street and Bennett Street

Proposed PM Peak (17:00 - 18:00pm) - Northbound Scenario

Signalised - Fixed time

Cycle Time = 80 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	367	0.0	0.293	6.2	LOS A	36	0.48	0.40	43.4
6	R	58	0.0	0.293	15.3	LOS B	24	0.70	0.76	36.5
Approach		425	0.0	0.293	7.5	LOS A	36	0.51	0.45	42.3
Bennett Street (North)										
7	L	72	0.0	0.263	31.0	LOS C	22	0.80	0.74	28.6
9	R	189	0.0	0.582	40.3	LOS C	61	0.97	0.81	25.4
Approach		261	0.0	0.582	37.8	LOS C	61	0.92	0.79	26.2
Birrell Street (West)										
10	L	244	0.0	0.284	20.7	LOS B	53	0.66	0.77	33.3
11	T	656	0.0	0.641	14.6	LOS B	134	0.77	0.69	36.9
Approach		900	0.0	0.641	16.3	LOS B	134	0.74	0.71	35.9
All Vehicles		1586	0.0	0.641	17.4	LOS B	134	0.71	0.66	35.2

Source: gtk consulting 2010

Figure A4.5: SIDRA modelling intersection Bondi Rd/Ocean St – northbound option AM peak



Movement Summary

Bondi Road and Ocean Street

Proposed AM Peak (7:45 - 8:45am) - Northbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Ocean Street (South)										
1	L	43	0.0	0.556	65.0	LOS E	51	1.00	0.78	19.5
2	T	53	0.0	0.556	58.6	LOS E	51	1.00	0.78	20.7
3	R	45	0.0	0.316	59.3	LOS E	25	0.94	0.74	20.6
Approach		141	0.0	0.556	60.8	LOS E	51	0.98	0.77	20.3
Bondi Road (East)										
4	L	64	0.0	0.409	8.5	LOS A	23	0.09	0.66	41.5
5	T	794	0.0	0.409	1.9	LOS A	23	0.09	0.09	47.8
6	R	25	0.0	0.410	8.2	LOS A	20	0.09	0.64	41.8
Approach		883	0.0	0.409	2.6	LOS A	23	0.09	0.15	47.1
Ocean Street (North)										
7	L	15	0.0	0.696	62.6	LOS E	82	1.00	0.86	19.9
8	T	157	0.0	0.697	56.2	LOS D	82	1.00	0.86	21.2
9	R	129	0.0	0.894	71.4	LOS F	69	0.98	1.00	18.4
Approach		301	0.0	0.894	63.0	LOS E	82	0.99	0.92	19.8
Bondi Road (West)										
10	L	35	0.0	0.186	9.7	LOS A	4	0.14	0.64	40.5
11	T	504	0.0	0.929	22.0	LOS B	155	0.42	0.56	32.6
12	R	93	0.0	0.931	31.4	LOS C	155	0.46	0.96	28.4
Approach		632	0.0	0.930	22.7	LOS B	155	0.41	0.62	32.3
All Vehicles		1957	0.0	0.931	22.6	LOS B	155	0.40	0.46	32.3

Source: gtk consulting 2010

Figure A4.6: SIDRA modelling intersection Bondi Rd/Ocean St – northbound option PM peak



Movement Summary

Bondi Road and Ocean Street

Proposed PM Peak (16:00 - 17:00pm) - Northbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Ocean Street (South)										
1	L	25	0.0	0.355	62.7	LOS E	34	0.97	0.76	19.9
2	T	38	0.0	0.355	56.3	LOS D	34	0.97	0.74	21.1
3	R	43	0.0	0.302	59.2	LOS E	24	0.94	0.73	20.6
Approach		106	0.0	0.355	59.0	LOS E	34	0.96	0.74	20.6
Bondi Road (East)										
4	L	90	0.0	0.166	7.2	LOS A	3	0.07	0.62	42.6
5	T	673	0.0	0.817	4.0	LOS A	80	0.24	0.24	45.6
6	R	21	0.0	0.825	10.5	LOS A	80	0.24	0.71	39.9
Approach		784	0.0	0.817	4.5	LOS A	80	0.22	0.29	45.1
Ocean Street (North)										
7	L	30	0.0	0.494	63.6	LOS E	48	0.99	0.78	19.7
8	T	61	0.0	0.494	57.2	LOS E	48	0.99	0.77	21.0
9	R	43	0.0	0.302	59.2	LOS E	24	0.94	0.73	20.6
Approach		134	0.0	0.494	59.3	LOS E	48	0.97	0.76	20.6
Bondi Road (West)										
10	L	96	0.0	0.748	8.6	LOS A	73	0.19	0.67	41.4
11	T	790	0.0	0.748	2.2	LOS A	73	0.19	0.17	47.4
12	R	208	0.0	0.995	99.1	LOS F	157	1.00	1.41	14.8
Approach		1094	0.0	0.996	21.2	LOS B	157	0.34	0.45	33.0
All Vehicles		2118	0.0	0.995	19.3	LOS B	157	0.37	0.43	34.1

Source: gtk consulting 2010

Figure A4.7: SIDRA modelling intersection Birrell St/Ocean St – northbound option AM peak



Movement Summary

Birrell Street and Ocean Street

Proposed AM Peak (7:45 - 8:45am) - Northbound Scenario

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	687	0.0	0.403	2.8	LOS A	41	0.66	0.00	51.9
6	R	62	0.0	0.403	11.1	LOS A	41	0.66	0.82	45.9
Approach		749	0.0	0.403	3.5	LOS A	41	0.66	0.07	51.4
Ocean Street (North)										
7	L	123	0.0	0.486	18.3	LOS B	22	0.66	1.00	39.8
9	R	97	0.0	0.485	18.5	LOS B	22	0.66	0.99	39.7
Approach		220	0.0	0.486	18.4	LOS B	22	0.66	0.99	39.8
Birrell Street (West)										
10	L	32	0.0	0.017	8.2	LOS A	0	0.00	0.67	49.0
11	T	387	0.0	0.198	0.0	LOS A	0	0.00	0.00	60.0
Approach		419	0.0	0.198	0.6	LOS A		0.00	0.05	59.0
All Vehicles		1388	0.0	0.486	5.0	Not Applicable	41	0.46	0.21	51.0

Source: gtk consulting 2010

Figure A4.8: SIDRA modelling intersection Birrell St/Ocean St – northbound option PM peak



Movement Summary

Birrell Street and Ocean Street

Proposed PM Peak (16:15 - 17:15pm) - Northbound Scenario

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	366	0.0	0.218	3.1	LOS A	18	0.64	0.00	52.2
6	R	30	0.0	0.217	11.4	LOS A	18	0.64	0.82	45.6
Approach		396	0.0	0.218	3.7	LOS A	18	0.64	0.06	51.6
Ocean Street (North)										
7	L	215	0.0	0.521	16.7	LOS B	26	0.70	1.04	41.1
9	R	64	0.0	0.520	16.8	LOS B	26	0.70	1.02	40.9
Approach		279	0.0	0.520	16.7	LOS B	26	0.70	1.03	41.0
Birrell Street (West)										
10	L	41	0.0	0.022	8.2	LOS A	0	0.00	0.67	49.0
11	T	567	0.0	0.291	0.0	LOS A	0	0.00	0.00	60.0
Approach		608	0.0	0.291	0.6	LOS A		0.00	0.04	59.1
All Vehicles		1283	0.0	0.521	5.0	Not Applicable	26	0.35	0.26	51.8

Source: gtk consulting 2010

APPENDIX 5 SIDRA RESULTS SOUTHBOUND OPTION

Figure A5.1: SIDRA modelling intersection Bondi Rd/Bennett St – southbound option AM peak



Movement Summary

Bondi Road and Bennett Street

Proposed AM Peak (7:45 - 8:45) - Southbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bennett St (South)										
1	L	193	0.0	1.000#	51.4	LOS D	77	0.98	0.81	22.3
2	T	180	0.0	0.516	41.2	LOS C	98	0.90	0.76	24.8
3	R	65	0.0	0.516	48.3	LOS D	98	0.91	0.82	23.1
Approach		438	0.0	1.000	46.7	LOS D	98	0.94	0.79	23.4
Bondi Road (East)										
4	L	38	0.0	0.919	39.3	LOS C	270	0.95	1.02	25.7
5	T	1036	0.0	0.920	37.6	LOS C	270	0.97	1.01	26.2
6	R	42	0.0	0.921	51.2	LOS D	200	1.00	1.04	22.4
Approach		1116	0.0	0.920	38.2	LOS C	270	0.97	1.01	26.0
Penkivil Street (North)										
7	L	62	0.0	0.354	51.3	LOS D	30	0.88	0.74	22.4
8	T	307	0.0	0.961	84.8	LOS F	233	1.00	1.34	16.4
9	R	109	0.0	0.961	91.2	LOS F	233	1.00	1.34	15.6
Approach		478	0.0	0.961	81.9	LOS F	233	0.98	1.26	16.8
Bondi Road (West)										
10	L	120	0.0	0.194	36.8	LOS C	46	0.75	0.76	26.5
11	T	503	0.0	0.688	33.8	LOS C	174	0.90	0.80	27.5
Approach		623	0.0	0.688	34.4	LOS C	174	0.87	0.79	27.3
All Vehicles		2655	0.0	1.000	46.6	LOS D	270	0.94	0.97	23.5

Source: gtk consulting 2010

Figure A5.2: SIDRA modelling intersection Bondi Rd/Bennett St – southbound option PM peak



Movement Summary

Bondi Road and Bennett Street

Proposed PM Peak (16:00 - 17:00pm) - Southbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Bennett St (South)										
1	L	108	0.0	0.669	61.7	LOS E	55	0.97	0.83	20.1
2	T	127	0.0	0.853	64.1	LOS E	101	1.00	1.01	19.6
3	R	77	0.0	0.853	70.5	LOS F	101	1.00	1.01	18.5
Approach		312	0.0	0.853	64.8	LOS E	101	0.99	0.95	19.5
Bondi Road (East)										
4	L	28	0.0	0.179	17.4	LOS B	13	0.33	0.66	35.2
5	T	636	0.0	0.893	26.5	LOS B	235	0.86	0.86	30.4
6	R	33	0.0	0.893	34.0	LOS C	235	0.90	0.97	27.5
Approach		697	0.0	0.893	26.5	LOS B	235	0.84	0.86	30.5
Penkivil Street (North)										
7	L	59	0.0	0.894	57.0	LOS E	30	0.87	0.82	21.1
8	T	208	0.0	0.523	39.0	LOS C	107	0.90	0.76	25.7
9	R	77	0.0	0.523	45.4	LOS D	107	0.90	0.83	23.9
Approach		344	0.0	0.894	43.5	LOS D	107	0.89	0.79	24.4
Bondi Road (West)										
10	L	139	0.0	0.532	33.7	LOS C	135	0.80	0.82	27.6
11	T	749	0.0	0.532	26.5	LOS B	141	0.79	0.69	30.4
Approach		888	0.0	0.532	27.7	LOS B	141	0.79	0.72	29.9
All Vehicles		2241	0.0	0.894	34.9	LOS C	235	0.85	0.80	27.1

Source: gtk consulting 2010

Figure A5.3: SIDRA modelling intersection Birrell St/Bennett St – southbound option AM peak



Movement Summary

Birrell Street and Bennett Street

Proposed AM Peak (7:30 - 8:30am) - Southbound Scenario

Signalised - Fixed time

Cycle Time = 60 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	833	0.0	0.737	11.1	LOS A	103	0.75	0.70	39.4
6	R	247	0.0	0.737	19.4	LOS B	68	0.94	0.89	34.1
Approach		1080	0.0	0.737	13.0	LOS A	103	0.80	0.75	38.1
Bennett Street (North)										
7	L	35	0.0	0.079	16.3	LOS B	6	0.58	0.69	35.9
9	R	292	0.0	0.674	30.7	LOS C	70	0.96	0.87	28.7
Approach		327	0.0	0.674	29.2	LOS C	70	0.92	0.85	29.4
Birrell Street (West)										
10	L	198	0.0	0.582	31.9	LOS C	51	0.96	0.81	28.3
11	T	366	0.0	0.704	23.2	LOS B	84	0.96	0.87	32.0
Approach		564	0.0	0.704	26.3	LOS B	84	0.96	0.85	30.6
All Vehicles		1971	0.0	0.737	19.5	LOS B	103	0.86	0.79	34.0

Source: gtk consulting 2010

Figure A5.4: SIDRA modelling intersection Birrell St/Bennett St – southbound option PM peak



Movement Summary

Birrell Street and Bennett Street

Proposed PM Peak (17:00 - 18:00pm) - Southbound Scenario

Signalised - Fixed time

Cycle Time = 90 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	367	0.0	0.351	5.3	LOS A	44	0.41	0.35	44.3
6	R	104	0.0	0.351	15.6	LOS B	23	0.68	0.76	36.3
Approach		471	0.0	0.351	7.6	LOS A	44	0.47	0.44	42.2
Bennett Street (North)										
7	L	72	0.0	0.301	36.3	LOS C	25	0.83	0.74	26.6
9	R	157	0.0	0.544	45.5	LOS D	58	0.97	0.80	23.8
Approach		229	0.0	0.543	42.7	LOS D	58	0.93	0.78	24.6
Birrell Street (West)										
10	L	282	0.0	0.291	19.3	LOS B	60	0.60	0.76	34.1
11	T	656	0.0	0.582	12.9	LOS A	133	0.69	0.62	38.1
Approach		938	0.0	0.582	14.8	LOS B	133	0.66	0.66	36.8
All Vehicles		1638	0.0	0.582	16.7	LOS B	133	0.64	0.61	35.6

Source: gtk consulting 2010

Figure A5.5: SIDRA modelling intersection Bondi Rd/Ocean St – southbound option AM peak



Movement Summary

Bondi Road and Ocean Street

Proposed AM Peak (7:45 - 8:45am) - Southbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Ocean Street (South)										
1	L	75	0.0	0.723	67.1	LOS E	66	1.00	0.87	19.1
2	T	53	0.0	0.722	60.7	LOS E	66	1.00	0.87	20.2
3	R	45	0.0	0.313	58.2	LOS E	24	0.93	0.73	20.8
Approach		173	0.0	0.723	62.8	LOS E	66	0.98	0.83	19.9
Bondi Road (East)										
4	L	64	0.0	0.559	18.1	LOS B	95	0.46	0.74	34.8
5	T	794	0.0	0.558	13.6	LOS A	95	0.50	0.44	37.6
6	R	25	0.0	0.558	22.1	LOS B	94	0.55	0.76	32.6
Approach		883	0.0	0.558	14.2	LOS A	95	0.50	0.47	37.2
Ocean Street (North)										
7	L	15	0.0	0.340	44.6	LOS D	69	0.85	0.79	24.1
8	T	157	0.0	0.340	38.2	LOS C	69	0.85	0.70	26.0
9	R	129	0.0	0.748	49.7	LOS D	58	0.83	0.87	22.7
Approach		301	0.0	0.748	43.5	LOS D	69	0.84	0.78	24.4
Bondi Road (West)										
10	L	35	0.0	0.285	17.9	LOS B	7	0.33	0.65	34.9
11	T	504	0.0	0.746	15.0	LOS B	136	0.65	0.58	36.7
12	R	24	0.0	0.743	21.4	LOS B	136	0.65	0.80	33.0
Approach		563	0.0	0.746	15.4	LOS B	136	0.63	0.59	36.4
All Vehicles		1920	0.0	0.748	23.5	LOS B	136	0.64	0.59	31.9

Source: gtk consulting 2010

Figure A5.6: SIDRA modelling intersection Bondi Rd/Ocean St – southbound option PM peak



Movement Summary

Bondi Road and Ocean Street

Proposed PM Peak (16:00 - 17:00pm) - Southbound Scenario

Signalised - Fixed time

Cycle Time = 120 seconds

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Ocean Street (South)										
1	L	37	0.0	0.445	64.3	LOS E	41	0.99	0.77	19.6
2	T	38	0.0	0.445	57.9	LOS E	41	0.99	0.76	20.8
3	R	43	0.0	0.302	59.2	LOS E	24	0.94	0.73	20.6
Approach		118	0.0	0.445	60.4	LOS E	41	0.97	0.75	20.3
Bondi Road (East)										
4	L	90	0.0	0.159	7.9	LOS A	3	0.12	0.63	42.0
5	T	673	0.0	0.697	2.1	LOS A	53	0.16	0.15	47.5
6	R	21	0.0	0.702	8.6	LOS A	53	0.16	0.66	41.4
Approach		784	0.0	0.698	3.0	LOS A	53	0.16	0.22	46.6
Ocean Street (North)										
7	L	30	0.0	0.494	63.6	LOS E	48	0.99	0.78	19.7
8	T	61	0.0	0.494	57.2	LOS E	48	0.99	0.77	21.0
9	R	43	0.0	0.302	59.2	LOS E	24	0.94	0.73	20.6
Approach		134	0.0	0.494	59.3	LOS E	48	0.97	0.76	20.6
Bondi Road (West)										
10	L	96	0.0	0.500	8.2	LOS A	31	0.10	0.64	41.8
11	T	790	0.0	0.500	1.8	LOS A	31	0.10	0.09	47.9
12	R	53	0.0	0.500	8.2	LOS A	20	0.10	0.64	41.7
Approach		939	0.0	0.500	2.8	LOS A	31	0.10	0.18	46.8
All Vehicles		1975	0.0	0.702	10.1	LOS A	53	0.23	0.27	40.1

Source: gtk consulting 2010

Figure A5.7: SIDRA modelling intersection Birrell St/Ocean St – southbound option AM peak



Movement Summary

Birrell Street and Ocean Street

Proposed AM Peak (7:45 - 8:45am) - Southbound Scenario

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	687	0.0	0.429	3.0	LOS A	46	0.68	0.00	51.7
6	R	94	0.0	0.429	11.3	LOS A	46	0.68	0.84	45.7
Approach		781	0.0	0.429	4.0	LOS A	46	0.68	0.10	50.9
Ocean Street (North)										
7	L	54	0.0	0.412	20.0	LOS B	16	0.72	0.97	38.7
9	R	97	0.0	0.413	20.1	LOS B	16	0.72	0.98	38.5
Approach		151	0.0	0.413	20.1	LOS B	16	0.72	0.98	38.6
Birrell Street (West)										
10	L	32	0.0	0.017	8.2	LOS A	0	0.00	0.67	49.0
11	T	387	0.0	0.198	0.0	LOS A	0	0.00	0.00	60.0
Approach		419	0.0	0.198	0.6	LOS A		0.00	0.05	59.0
All Vehicles		1351	0.0	0.429	4.8	Not Applicable	46	0.47	0.18	51.3

Source: gtk consulting 2010

Figure A5.8: SIDRA modelling intersection Birrell St/Ocean St – southbound option PM peak

SIDRA INTERSECTION

Movement Summary

Birrell Street and Ocean Street

Proposed PM Peak (16:15 - 17:15pm) - Southbound Scenario

Give-way

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Birrell Street (East)										
5	T	366	0.0	0.230	3.1	LOS A	18	0.64	0.00	52.1
6	R	42	0.0	0.230	11.4	LOS A	18	0.64	0.83	45.6
Approach		408	0.0	0.230	4.0	LOS A	18	0.64	0.08	51.4
Ocean Street (North)										
7	L	60	0.0	0.270	15.5	LOS B	9	0.67	0.92	42.0
9	R	64	0.0	0.270	15.6	LOS B	9	0.67	0.92	41.9
Approach		124	0.0	0.270	15.6	LOS B	9	0.67	0.92	41.9
Birrell Street (West)										
10	L	41	0.0	0.022	8.2	LOS A	0	0.00	0.67	49.0
11	T	567	0.0	0.291	0.0	LOS A	0	0.00	0.00	60.0
Approach		608	0.0	0.291	0.6	LOS A		0.00	0.04	59.1
All Vehicles		1140	0.0	0.291	3.4	Not Applicable	18	0.30	0.15	53.8

Source: gtk consulting 2010

APPENDIX 6 CRASH DATA

Figure A6.1: Study area crash statistics June Quarter 2004 – March Quarter 2009

Accident Street	Accident Date	Accident Degree	Accident Distance (metres)	Accident Direction	Accident Identifying Object	Number Persons Killed	Number Persons Injured	Number Peds. Killed	Number Peds. Injured
Birrell St	21/04/2004	Non-casualty	25	E	Bennett St	0	0	0	0
	27/07/2004	Injury	0	0	Dickson St	0	1	0	0
	29/10/2004	Non-casualty	0	0	Park Pde	0	0	0	0
	16/02/2005	Injury	0	0	Park Pde	0	1	0	0
	18/06/2005	Injury	10	W	Bennett St	0	3	0	0
	22/10/2006	Injury	0	0	Park Pde	0	2	0	0
	24/01/2007	Non-casualty	0	0	Park Pde	0	0	0	0
	01/05/2007	Injury	0	0	Ocean St	0	1	0	0
	22/09/2007	Non-casualty	0	0	Park Pde	0	0	0	0
	07/08/2008	Injury	0	0	Ocean St	0	1	0	0
Bennett St	13/01/2009	Injury	20	E	Bennett St	0	1	0	0
	03/11/2004	Injury	0	0	King St	0	1	0	0
	26/10/2005	Non-casualty	25	N	Stephen St	0	0	0	0
	27/07/2006	Non-casualty	0	0	King St	0	0	0	0
	20/07/2007	Injury	10	S	King St	0	1	0	0
	04/04/2008	Injury	10	N	King St	0	1	0	0
	15/12/2008	Injury	10	S	Bondi Rd	0	1	0	1
	10/03/2009	Non-casualty	0	0	Birrell St	0	0	0	0
Bondi Rd	14/03/2009	Injury	0	0	King St	0	1	0	0
	11/06/2004	Injury	20	W	Bennett St	0	1	0	1
	28/06/2004	Injury	10	W	Bennett St	0	1	0	0
	25/09/2004	Injury	0	0	Ocean St	0	1	0	1
	02/10/2004	Injury	0	0	Bennett St	0	1	0	0
	04/10/2004	Injury	0	0	Anglesea St	0	1	0	0
	12/04/2004	Injury	10	W	Anglesea St	0	1	0	0
	17/10/2004	Injury	25	E	Park Pde	0	1	0	0
	20/11/2004	Injury	0	0	Ocean St	0	1	0	0
	22/12/2004	Injury	10	W	Park Pde	0	2	0	0
	02/03/2005	Non-casualty	10	E	Ocean St	0	0	0	0
	20/04/2005	Non-casualty	0	0	Penkivil St	0	0	0	0
	22/04/2005	Injury	0	0	Penkivil St	0	1	0	0
	30/05/2005	Non-casualty	0	0	Ocean St	0	0	0	0
	09/06/2005	Non-casualty	0	0	Ocean St	0	0	0	0
	10/06/2005	Injury	0	0	Ocean St	0	1	0	0
	02/07/2005	Injury	5	W	Bennett St	0	1	0	0
	30/08/2005	Injury	0	0	Ocean St	0	1	0	0
	06/02/2006	Injury	0	0	Ocean St	0	1	0	1
	12/02/2006	Injury	6	E	Anglesea St	0	1	0	0
	02/03/2006	Non-casualty	0	0	Ocean St	0	0	0	0
	23/03/2006	Injury	0	0	Park Pde	0	1	0	0
	30/04/2006	Injury	20	W	Bennett St	0	1	0	1
	25/06/2006	Non-casualty	10	E	Park Pde	0	0	0	0
	30/06/2006	Injury	0	0	Ocean St	0	1	0	0
	29/08/2006	Non-casualty	0	0	Ocean St	0	0	0	0
	2/09/2006	Non-casualty	5	W	Ocean St	0	0	0	0
	30/09/2006	Non-casualty	0	0	Ocean St	0	0	0	0
	17/10/2006	Non-casualty	0	0	Ocean St	0	0	0	0
	14/05/2007	Non-casualty	0	0	Ocean St	0	0	0	0
	29/05/2007	Injury	0	0	Park Pde	0	1	0	0
	23/07/2007	Injury	5	E	Anglesea St	0	2	0	0
	01/09/2007	Non-casualty	10	W	Bennett St	0	0	0	0
	23/10/2007	Non-casualty	5	W	Ocean St	0	0	0	0
	14/02/2008	Injury	0	0	Ocean St	0	1	0	0
	06/03/2008	Injury	0	0	Anglesea St	0	1	0	0
	07/03/2008	Non-casualty	20	E	Park Pde	0	0	0	0
	03/11/2008	Non-casualty	0	0	Park Pde	0	0	0	0
	21/12/2008	Non-casualty	0	0	Park Pde	0	0	0	0
Ocean St	02/06/2004	Fatal	2	S	Bondi Rd	1	0	1	0
	13/10/2005	Non-casualty	12	S	Bondi Rd	0	0	0	0
	21/10/2005	Injury	20	S	Bondi Rd	0	2	0	0
Park Pde	17/01/2009	Non-casualty	0	0	King St	0	0	0	0
	13/08/2005	Non-casualty	30	N	Birrell St	0	0	0	0
	15/03/2008	Injury	30	N	Birrell St	0	1	0	0
	13/01/2009	Non-casualty	20	S	Bondi Rd	0	0	0	0
	14/01/2009	Non-casualty	30	S	Bondi Rd	0	0	0	0

Source: RTA Crash Analysis Unit 2010

APPENDIX 7 PARKING SURVEY DATA

Table A7-1: On-street parking demand Park Parade Bondi Wednesday 8/4/09

Street Name	Parking Location	Capacity	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm
Park Pde	No. occupied west side	0	0	0	0	0	0	0	0	0	0	0
	No. occupied east side	52	46	33	34	33	37	34	45	48	49	52
	Total occupied spaces	52	46	33	34	33	37	34	45	48	49	52
	% Spaces Occupied		88%	63%	65%	63%	71%	65%	87%	92%	94%	100%

Source: TTM 2009

Table A7-2: On-street parking demand Park Parade Bondi Saturday 21/2/09

Street Name	Parking Location	Capacity	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm
Park Pde	No. occupied west side	0	0	0	0	0	0	0	0	0	0	0
	No. occupied east side	52	51	45	44	41	39	40	47	47	50	48
	Total occupied spaces	52	51	45	44	41	39	40	47	47	50	48
	% Spaces Occupied		98%	87%	85%	79%	75%	77%	90%	90%	96%	92%

Source: TTM 2009

APPENDIX 8 COUNCIL MEETING MINUTES 2 NOVEMBER 2010

Figure 8.1: Council Meeting Minutes 2 November 2010**1011.13.4.1****Minutes of Community, Housing, Environmental Services & Public Works Committee Meeting – 2 November 2010 – Clause C-1011.4 – Park Parade, Bondi – Traffic and Parking Study (A10/0459)**

This matter was saved and excepted by Cr Kay.

MOTION (Kay / Guttman-Jones)

That the recommendation of the Community, Housing, Environmental Services & Public Works Committee Meeting of its meeting on 2 November 2010 be adopted subject to it reading as follows:

“That:

1. Council receive and note the report.
2. Council endorse the draft traffic and parking study for Park Parade and the following measures to resolve traffic and parking issues in Park Parade:
 - (a). Implement one-way southbound traffic flow in Park Parade.
 - (b). Install parallel parking along the entire eastern and western sides of Park Parade subject to clause 2(d) below.
 - (c). Introduce traffic calming devices including kerb blisters, speed cushions, edge line markings, and threshold treatments at both ends of Park Parade indicating a high pedestrian zone.
 - (d). Install a formal time limited ‘kiss and drop’ zone on the northern side of Birrell Street between the corner of Park Parade and the bus zone to the west of Park Parade and for approximately 30m from Birrell Street along the western side of Park Parade, with details to be provided by the Waverley Traffic Committee.
3. Council undertake community consultation on the proposal and all other options as outlined in the report, and subject to the above amendments, with the addition that an information leaflet be forwarded to all Precinct committees.
4. The option of a 40k/hr local speed zone be incorporated into each of the proposals for community consultation.
5. A further report be submitted to Council following the community consultation”.

THE MOTION WAS PUT AND DECLARED LOST.

A FURTHER MOTION WAS THEN MOVED, SECONDED AND DECLARED CARRIED.

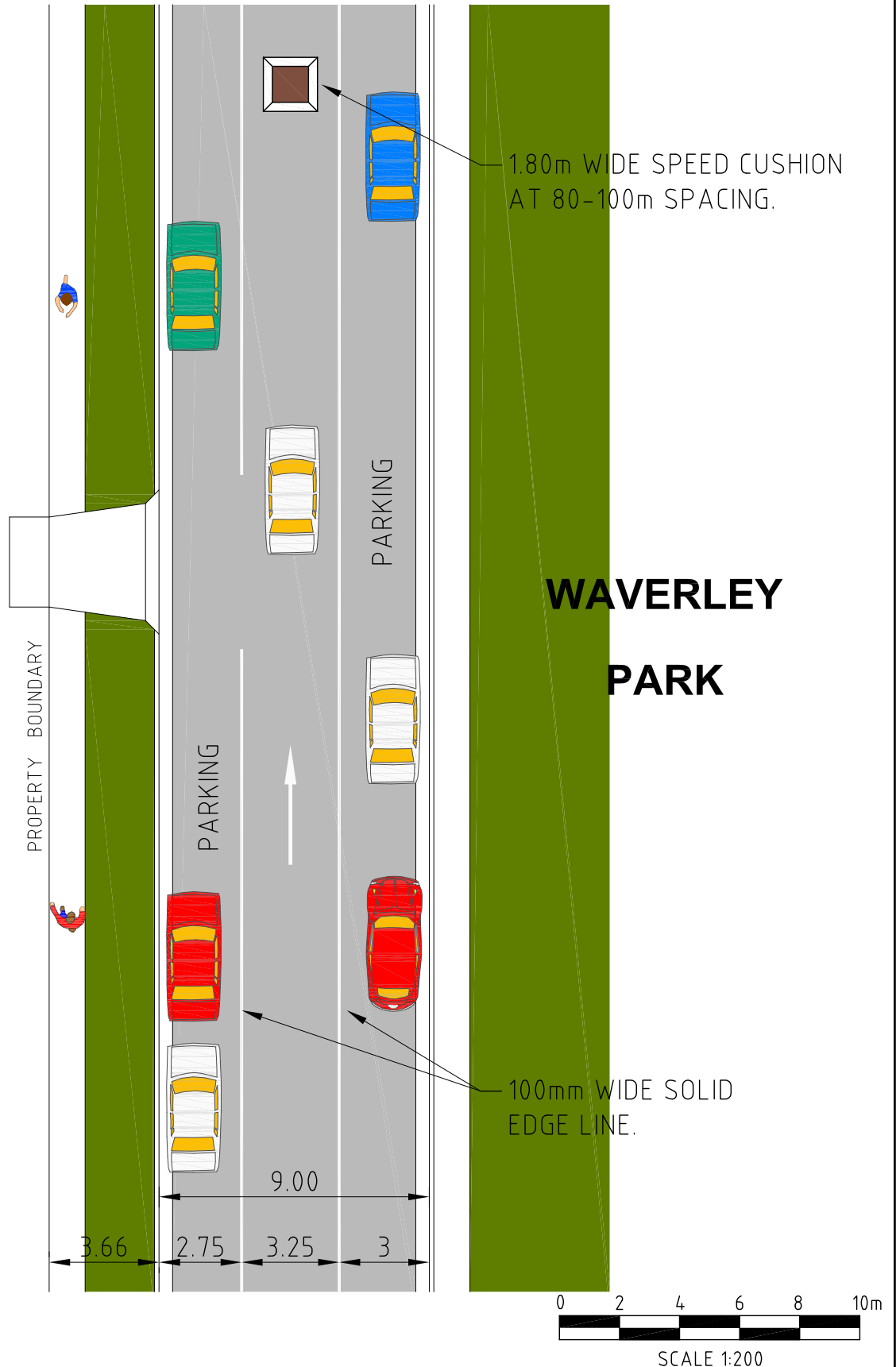
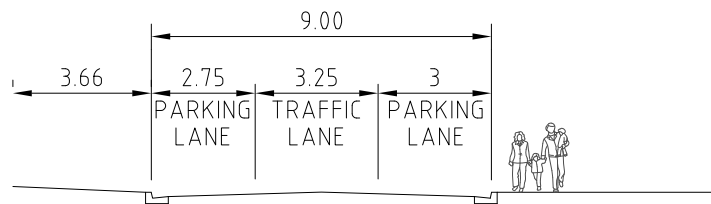
MOTION / DECISION (Strewe / Cancian)

That:

1. The above Motion be adopted subject to:
 - (a). Clause 2(b) reading as follows:
“Install parallel parking along the entire eastern side of Park Parade and along the western side of Park Parade from Bondi Road to approximately 150m north of Birrell Street”.
 - (b). Clause 2(d) reading as follows:
“Install a formal time limited ‘kiss and drop’ zone on the northern side of Birrell Street between the corner of Park Parade and the bus zone to the west of Park Parade and for approximately 150m from Birrell Street along the western side of Park Parade, with details to be provided by the Waverley Traffic Committee”.
2. The following wording be included in the material distributed to the community :
“The reason the parallel parking stops at the end of the wall on the western side of Park Parade is to preserve views into the park”.

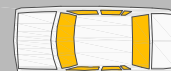
Source: Waverley Council 2010

APPENDIX 9 CONCEPT PLANS



BIRRELL

STREET



10m

PARADE

PARKING

PARKING

**WAVERLEY
PARK**

1.80m WIDE SPEED CUSHION
AT 80-100m SPACING.

9.00

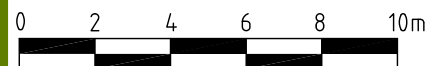
2.75

3.25

3

100mm WIDE SOLID
EDGE LINE.

PARK



SCALE 1:200